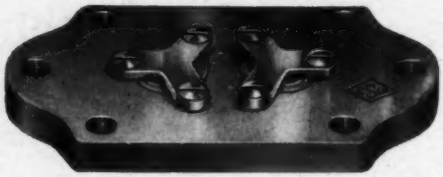
Refrigeration Service Engineer

VOL. 15 | NO. 6 | JUNE · 1947

★ JUN 17 1947 ★

Chicago Valve Plates



THE HEART OF YOUR COMPRESSOR

SOLD THROUGH LEADING
REFRIGERATION WHOLESALERS

PERFECT BALANCE

Chicago Seals
MODERN DESIGN

FOR TROUBLE-FREE PERFORMANCE USE CHICAGO VALVE PLATES

The only Valve Plate with the replaceable valve seats.

Available for
340 MODELS

CHICAGO SEAL CO. 20 N. WACKER DR., CHICAGO 6, ILL.

THE REFRIGERATION SERVICE ENGINEER, Nickerson & Collins Co., Publishers, 435 N. Waller Ave., Chicago 44, Ill. Published monthly, Vol. 15, No. 6, June, 1947. Entered as second class matter March 4, 1938, Chicago, Ill., under the Act of March 3, 1879. Subscription in the United States, $3.00 per year; all other countries, $3.00 per year.

The ANSUL Method of ANALYSIS FOR WAX in Oil-Refrigerant Mixtures

BRA
947
DETROIT

WARNING!
Do not handle the sealed glass tubes when they are at room temperature except when wearing goggles or preferably a face mask.

PREPARATION OF SAMPLES

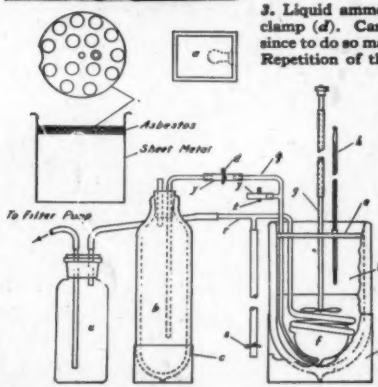
1. The desired amount of refrigeration oil is placed in an ordinary glass test tube.
2. The upper portion of the test tube is carefully drawn to a capillary without deleterious effects on the refrigeration oil.
3. Connect the tube to a source of refrigerant desired.
4. By means of cooling the exterior of the tube, the refrigerant is drawn into the test tube to a predetermined mark which makes the concentration of oil in refrigerant desired.
5. Using a hand torch, the capillary neck is sealed off.
6. Place wire screen around sealed tube for safety.

OPERATION OF APPARATUS

1. After tubes are placed in the bath, the stirrer (*g*) is operated at a speed which insures uniform temperature in all parts of the bath.

2. Suction is applied at (*r*).

3. Liquid ammonia is introduced into the cooling coil by opening clamp (*d*). Care must be taken not to admit too much ammonia, since to do so may result in violent boiling and an unnecessary waste. Repetition of this operation will result in cooling the bath to the desired temperature. In order to stop cooling, the vacuum is broken by opening pinch clamp (*s*).



4. The temperature of the bath can be kept constant within 1° F. at any point between +60° F. and −95° F.

5. The temperature of the bath is decreased in 2° intervals, more or less, depending on the accuracy required.

6. Starting at −10° F. the temperature is kept constant for at least 8 minutes. The sample tube must not be disturbed during this time.

7. In order to detect wax when and if formed, the sample tube is taken out of the bath and examined in front of the light box or other suitable light source. Haziness must not be mistaken for wax separation. Normally the wax forms a floc.

ANSUL WHOLESALERS are ready and equipped to render an intelligent, cooperative service to refrigeration engineers and maintenance men on problems which arise from time-to-time in the operation of refrigerating systems.

FOR EXAMPLE: Samples of refrigeration oils, submitted by users of Ansul Refrigerants to Ansul Wholesalers, are tested by Ansul laboratories without charge by the Ansul Wax Determination Method. This method, developed and standardized especially for use in connection with oils used in refrigerating systems, provides an accurate determination of wax separating from oil-refrigerant mixtures at low temperatures.

For more complete information, send for ANSUL NEWS NOTES, Vol. 9, No. 3

LIQUID Methyl Chloride by ANSUL* LIQUID Sulfur Dioxide by ANSUL*

*T. M. Reg. U.S. Pat. Off.

ANSUL REFRIGERANTS ARE AVAILABLE AT LEADING WHOLESALERS EVERYWHERE

ANSUL CHEMICAL COMPANY
REFRIGERATION DIVISION, MARINETTE, WISCONSIN
DISTRIBUTORS FOR KINETIC'S "FREON-11," "FREON-12," "FREON-21," "FREON-22" AND "FREON-113"

"Detroit" THERMOSTATIC EXPANSION VALVES help keep the nation Cool

No. 673 Thermostatic Expansion Valve

For many years the standard of the refrigeration industry. Orifice sizes 3/64" to 7/32" with capacities up to 3½ tons Freon-12 and 6 tons Methyl.

industry. Orifice sizes 3/64" to 7/32" with capacities up to 3½ tons Freon-12 and 6 tons Methyl.

No. 787 Expansion Valve

Representative of the "Detroit" large capacity line. No. 788 is rated 12 to 20 tons; No. 787–6 to 11 tons; No. 786–3 to 6 tons, Freon-12. Have external equalizer connection and can be furnished with No. 790 distributor with either 6, 12 or 18 openings (¼" each) for multiple distribution.

"Detroit" Thermostatic Expansion Valves are favored by refrigeration men everywhere for air conditioning as well as other refrigeration installations.

"Detroit" Valves are available in the desired capacities. They have the dependability and durability to give long service without attention.

Gas-charging gives "Detroit" Valves close regulation—guards against motor overload—assures completely refrigerated coils at all times. Often, gas-charging makes possible use of a smaller motor since it does not have to work against excessive pressure during the pulldown period. Gas-charged valves balance the system more quickly when starting up, insuring fast, positive action.

2642

DETROIT LUBRICATOR COMPANY

"DETROIT"

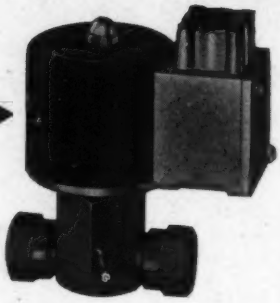
General Offices: 5900 TRUMBULL AVENUE, DETROIT 8, MICHIGAN

Division of AMERICAN RADIATOR & STANDARD SANITARY CORPORATION

Canadian Representatives — RAILWAY AND ENGINEERING SPECIALTIES LIMITED, MONTREAL, TORONTO, WINNIPEG

"Detroit" Heating and Refrigeration Controls • Engine Safety Controls • Safety Float Valves and Oil Burner Accessories • "Detroit" Expansion Valves and Refrigeration Accessories • Stationary and Locomotive Lubricators

2 Tons Freon **SV 21**
Brass body, renewable soft Neoprene seat. Come-apart construction with rotatable coil and aluminum junction box. ⅜" F.P.T. connection.



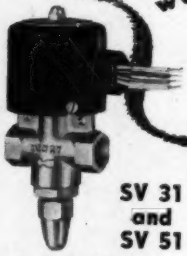
SV 11 **1 Ton Freon**
Brass body, mounted in standard electrical outlet box. Easily installed. ⅜" F.P.T. connections.

INTERNAL PARTS OF HENRY SOLENOID VALVES ARE MADE OF STAINLESS STEEL.

Henry Solenoid Valves

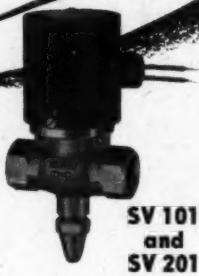
choice of refrigeration engineers who want quiet, efficient valves

...of advanced design!



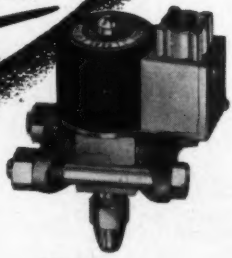
SV 31 and SV 51

3 Tons and 5 Tons Freon
Brass body, come-apart construction with rotatable coil housing. Two piece impact plunger with direct acting metal-to-metal seat on SV 31. Neoprene seat on SV 51. Manual operating stem. ⅜" and ½" F.P.T. or solder connections.



SV 101 and SV 201

10 Tons and 20 Tons Freon
Brass body with flanged come-apart construction. Pilot-piston operated. Connections ¾" F.P.T. or ⅞" O.D. solder.



SV 22

10 Tons Ammonia
Steel body with come-apart construction and hardened steel renewable seat. Aluminum junction box. Manual operating stem. ⅜" and ½" F.P.T. flanged connections.

SOLD BY LEADING JOBBERS

HENRY VALVE COMPANY

Control Devices, Valves, Driers, Strainers and Accessories for Refrigeration and Air Conditioning and Industrial Applications

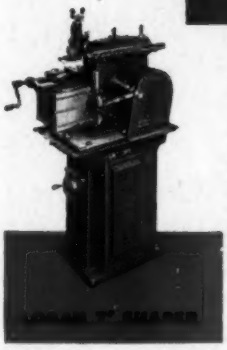
3260 W. GRAND AVENUE • CHICAGO 51, ILLINOIS Cable: EVALCO CHICAGO 6

Logan.. A NAME TO REMEMBER WHEN YOU THINK OF BETTER LATHES AND SHAPERS

No. 820
Quick Change
Gear Lathe

Adaptability

Another Reason Why LOGAN Lathes Serve Many Industries

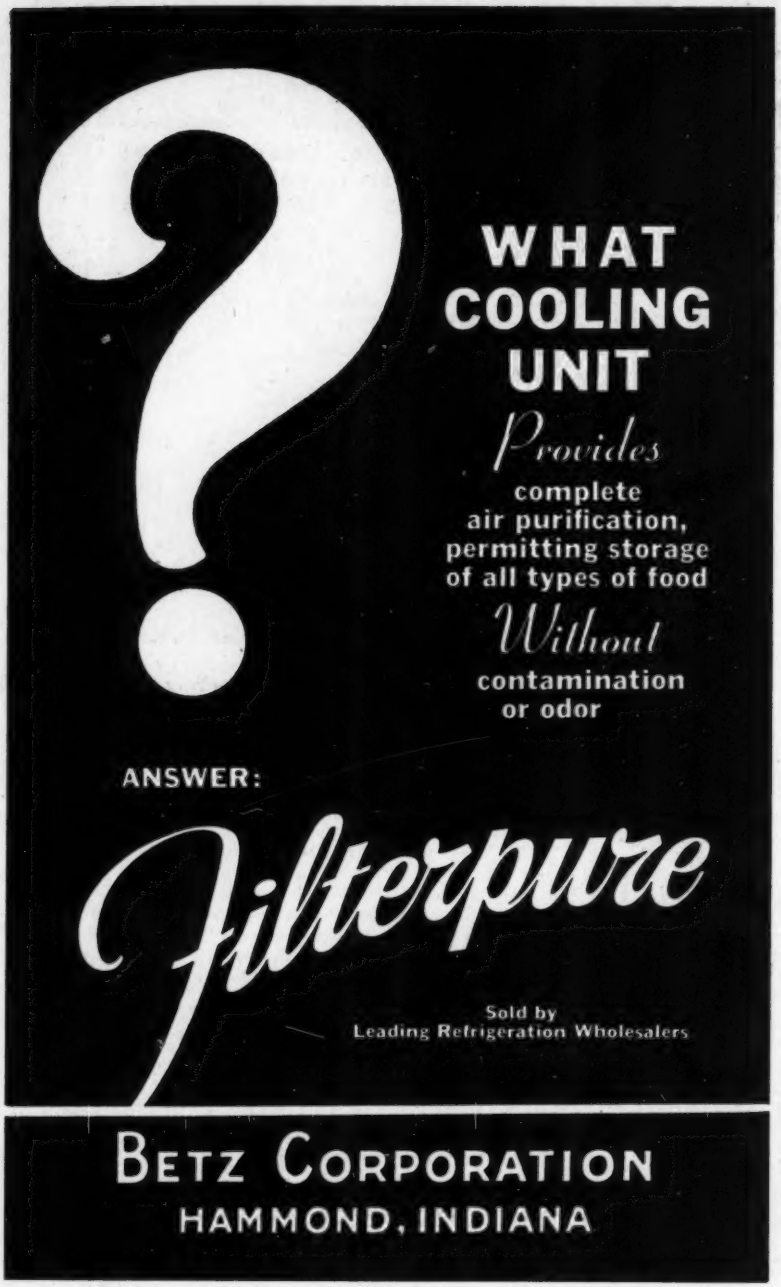


• The Logan Lathe's reputation for adaptability has been earned in many industries, in exacting tool room work, and on a variety of production operations. The Logan ball bearing spindle, for example, has a speed range of 30 to 1450 rpm. High speed carbide cutting tools can be used to full advantage, yet the lathe is equally adaptable to slow speed work. The wider range of Logan spindle speeds assures the most effective rpm for light or heavy cuts, as well as for machining widely different materials such as steels, cast iron, non-ferrous metals, and plastics. Rugged, precise construction throughout, plus Logan advanced design features assure lasting accuracy. A complete line of lathe accessories and attachments further increases the adaptability of Logan Lathes. Write for full information. T-2

SPECIFICATIONS COMMON TO ALL LOGAN LATHES . . . swing over bed, 10½" . . . bed length, 43⅛" . . . size of hole through spindle, 25/32" . . . spindle nose diameter and threads per inch, 1½"—8 . . . 12 spindle speeds, 30 to 1450 rpm . . . motor, ½ hp, 1750 rpm . . . ball bearing spindle mounting . . . drum type reversing motor switch and cord . . . precision-ground ways, 2 V-ways and 2 flat ways.

DISTRICT OFFICES: Woolworth Bldg. New York 7, N. Y. Cortland 7-8024 • 550 W. Washington Blvd. Chicago 6, Illinois Central 1246 • 1672 Mission Street San Francisco, Calif. Underhill 6682

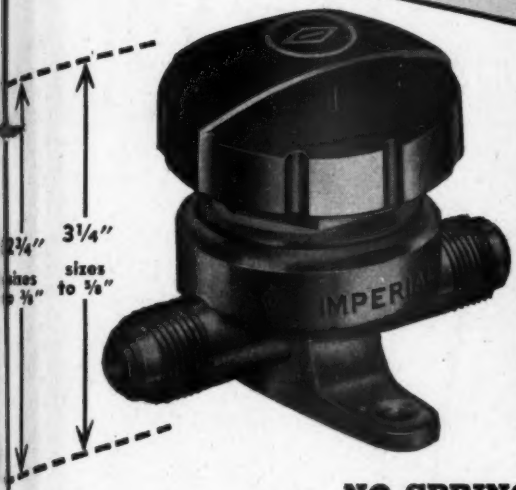
LOGAN ENGINEERING CO. CHICAGO 30, ILLINOIS

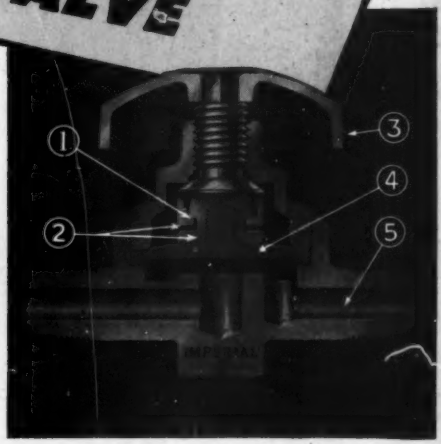

WHAT
COOLING
UNIT
Provides
complete
air purification,
permitting storage
of all types of food
Without
contamination
or odor
ANSWER:
Filterpure
Sold by
Leading Refrigeration Wholesalers
BETZ CORPORATION
HAMMOND, INDIANA

LOW OVERALL HEIGHT

Means Neat, Compact Installations

IMPERIAL DIASEAL VALVE





NO SPRINGS • "EITHER-WAY" FLOW

Extremely low height — *another important point of superiority of DiaSeal Valves* — is a decided advantage where installations are made in aisles or close quarters.

They offer a minimum of protrusion. In fact, Imperial DiaSeal Valves — in sizes up to and including ⅝" O.D. — can be installed in a 4" conduit box with room to spare.

Other features that make the DiaSeal the outstanding valve for refrigeration service are readily apparent in the sectional view.

Ask for Bulletin 103-REF

See Your Jobber

1. NO SPRINGS —DiaSeal Valve cannot "stick shut" because diaphragm is lifted mechanically. Positive control with flow in either direction.

2. ONLY TWO MOVING PARTS — Simple construction assures greater dependability.

3. EASY FINGER-TIP ACTION — Quick, sure opening and closing with less than two turns of handle.

4. LONG LIFE DIAPHRAGM is impervious to all common refrigerants. In actual tests, has withstood over 1,000,000 openings and closings under refrigerant pressure.

5. INLET AND OUTLET PORTS IN LINE. Simplifies installation.

Furnished in 2-way and angle types, with either flare or solder connections. The Imperial Triple-Seal Groove is an added feature on flare connections ⅜" and larger.

THE IMPERIAL BRASS MFG. CO., 534 S. Racine Avenue, Chicago 7, Illinois

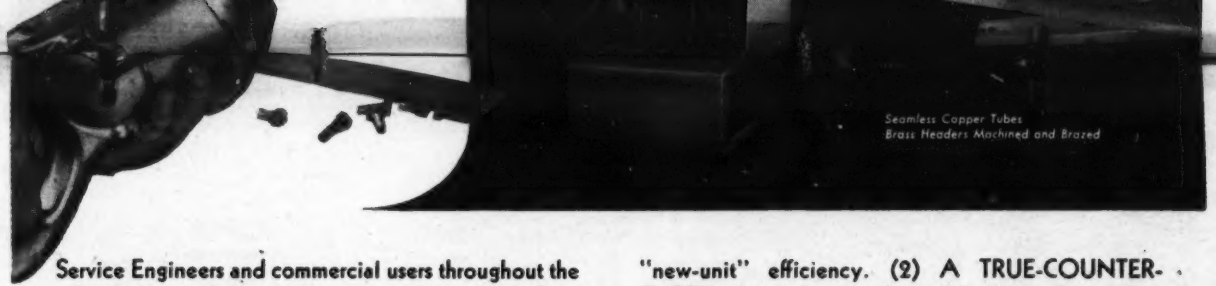
IMPERIAL

FITTINGS • VALVES • FILTERS • FLOATS • DEHYDRATORS • CHARGING LINES • TOOLS FOR CUTTING, FLARING, BENDING, PINCH-OFF AND SWEDGING

This is the Business End of . . .

HALSTEAD & MITCHELL

Cleanable CONDENSERS



Service Engineers and commercial users throughout the refrigeration industry are now specifying HM Condensers for replacement and conversion orders. These new HM units combine two features never before obtainable in tube-within-a-tube water-cooled condensers; (1) They're CLEANABLE . . . the water tubes are easily accessible at both ends for the spiral cleaning tool to restore the interior water surfaces to "new-unit" efficiency. (2) A TRUE-COUNTER-FLOW relationship is achieved between the coolant and the refrigerant through a unique seamless copper tube-within-a-tube construction that makes obsolete most types of similar water-cooled condensers. Thus, water and space requirements are reduced substantially and a most economical operation is obtained.

JOBBERS in all principal cities carry HM condensers in stock for immediate delivery.

HM Halstead & Mitchell

OFFICES: Bessemer Building, Pittsburgh 22, Pa.

DOUBLE-TUBE COUNTER-FLOW **CLEANABLE** WATER-COOLED CONDENSERS

"It's almost automatic...*and fool-proof!*"

More than any other condensing unit of open type design, the Mills Direct Drive is automatic in performance and fool-proof in operation. In those qualities it ranks with hermetics, while at the same time retaining the accessibility and swift repair characteristics of belted models.

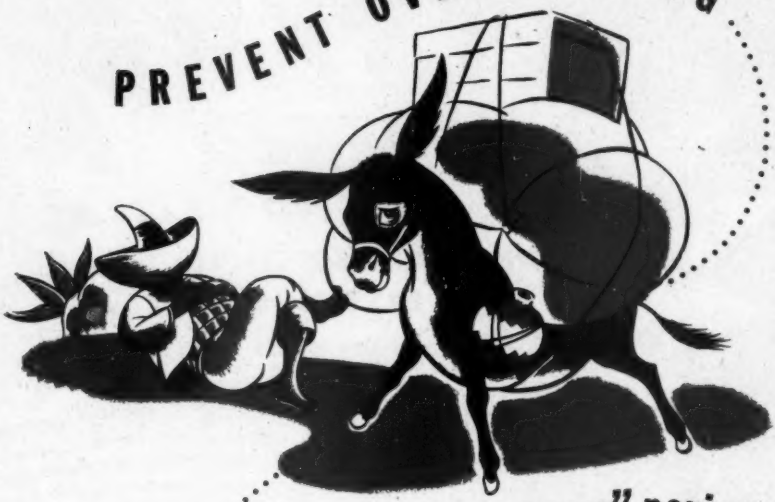
Smaller in size, lighter in weight, and more efficient in comparable ratings, the Mills Direct Drive is the logical choice where space and accessibility are determining factors.

MILLS
Direct Drive
COMPRESSOR

First post-war addition to a distinguished family of air- and water-cooled condensing units

MILLS INDUSTRIES, INCORPORATED • 4100 FULLERTON AVENUE • CHICAGO 39, ILLINOIS

PREVENT OVERLOADING



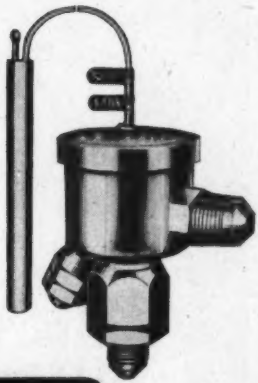
... during "pull-down" period

with the Alco THERMO-LIMIT Valve

Now it's easy to protect motor and compressor against overloading. Operation of the Alco THERMO-LIMIT Valve is automatically limited to five predetermined suction pressure settings: 10, 15, 30, 45, or 55 pounds.

Quickly interchangeable cartridges do the trick. And the THERMO-LIMIT is liquid-charged, so you can install it in any location or position.

Available at your wholesaler's for smaller capacity commercial refrigeration. Ask for our Bulletin 152.



ALCO VALVE CO.

857 KINGSLAND AVE. • ST. LOUIS 5, MO.

Designers and Manufacturers of Thermostatic Expansion Valves; Pressure Regulating Valves; Solenoid Valves; Float Valves; Float Switches.

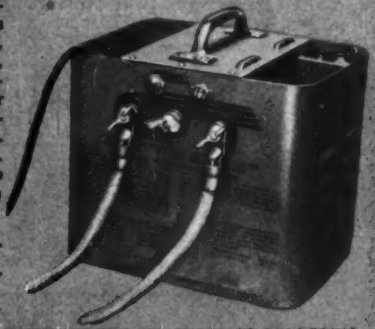
ENGINEERED
to fit..
FORGED FLARE NUTS
AND FITTINGS
Prompt Shipment on most items
Electrimatic
2100 INDIANA AVE CHICAGO 16 ILLINOIS

Here's the easier, safer way to do soldering on repair and service jobs

IDEAL "THERMO-GRIP"

Soldering Set

This is the new and improved unit to use for brazing and all soldering jobs such as sweating and unsweating threadless copper pipes and fittings, soldering lugs and terminals, etc. The Ideal "Thermo-Grip" is light weight, compact, portable, and economical. Operates on resistance heating principle... *faster*—heats 1¼" copper pipe to soldering temperature in less than a minute . . . *safer*—all parts fully insulated; no fire hazard . . . *easier*—handy thumb switch permits close heat control. Draws current only when in use. Write today for full information.

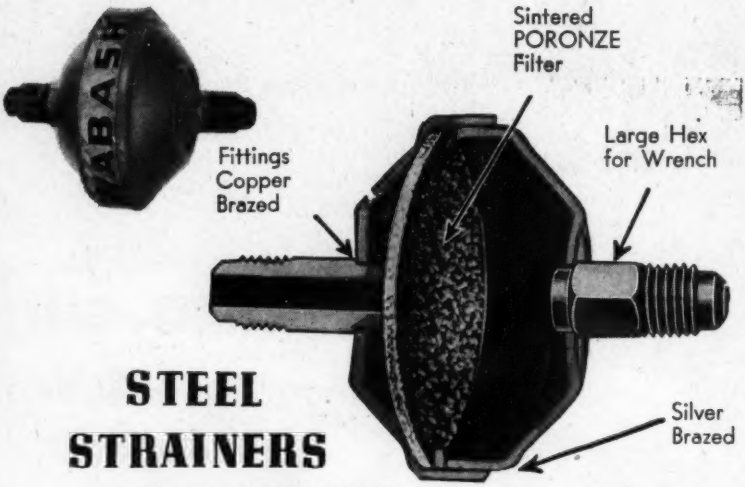


IDEAL INDUSTRIES, INC.
Successor to Ideal Commutator Dresser Co.
1082 PARK AVE. SYCAMORE, ILL.

IDEAL

ATTACHMENTS FOR ALL TYPES OF SOLDERING
"Plier" Attachment for soldering work that can be held in jaws . . . *"Pencil"* Attachment for spot or seam soldering . . . *"Fork"* Attachment for soldering in restricted places.

Distributed Through AMERICA'S LEADING WHOLESALERS



STEEL STRAINERS

with sintered PORONZE

- Equipped with sintered PORONZE filter to insure removal of dirt, scale and sludge with a minimum pressure drop.
- All-steel construction with hydrogen brazed fittings assures clean, flux-free interior.

ORDER FROM YOUR LOCAL JOBBER

WABASH

MANUFACTURING CO.

2642 S. Michigan Ave.

Chicago 16, Ill.

Str-r-rike!

There's an easy out to all of your supply problems in Kelvinator's network of 50 parts depots. Conveniently located throughout the country, they carry a *complete* line of refrigeration parts and supplies.

There's one near you for convenient over-the-counter service, or, if you prefer, mail or phone your order. Either way, it means quick service to you on the part you need—*when* you need it—and it's *competitively priced.*

DIVISION OF NASH-KELVINATOR CORPORATION, DETROIT

Kelvinator

CONDENSING UNITS
REFRIGERATION PARTS AND SUPPLIES

BUY KELVINATOR FOR ALL YOUR REFRIGERATION REQUIREMENTS

Keep Your Profits

with a SOUTH BEND LATHE

Profits walk out of your shop every day if you don't have a South Bend Lathe. Every machining job sent outside represents the sharing of profits with someone else. Repair work refused because it involves machining is profitable business lost.

South Bend Lathes are made with 9", 10", 13", 14½", and 16" swings—write for illustrated Catalog 100-F for complete information. Prices start at $145.00, f. o. b. factory, less electrical equipment.

SOUTH BEND LATHE WORKS
Building Better Lathes Since 1906
529 E. MADISON ST., SOUTH BEND 22, INDIANA

PROMPT DELIVERY
Quick delivery from distributors' stocks or from factory.

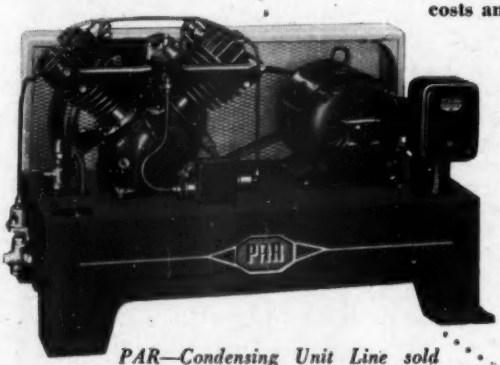
PRICES
Average price increase over prewar level less than 15%.

TIME PAYMENTS
Factory Time Payment Plan. 25% down, 12 months to pay. Moderate finance charge.

"HOW TO RUN A LATHE"
Practical 128-page handbook. 25 cents, postpaid.

PAR REFRIGERATION UNITS

are designed and built in a wide range of models and sizes to give you dependable economical refrigeration. Air-cooled and water-cooled . . . close-coupled and heavy duty type . . . and in sizes from 1/6 hp to 5 hp. Regardless of your requirements, there's a Par unit for "tailored" installations that give lower operating costs and longer trouble-free service.



Ask your Par wholesaler about Par or write for illustrated Catalog R-98

PAR—Condensing Unit Line sold exclusively through Franchised Refrigeration Equipment Wholesalers!

. . . By Comparison — You'll Buy PAR

Lynch Manufacturing Corporation

General Offices, Toledo 1 • Factory, Defiance, Ohio, U.S.A.

TEST

. . . for volts, amperes, or watts with this one small, compact instrument

Here is the first appliance tester ever made that gives you volt, ampere, and wattage readings all from one small, compact instrument. Model 390 slips easily into a large pocket, weighs only a pound and a half, is designed for hard, continuous service.

The range of uses for this volt-amp-wattmeter is almost unlimited in checking line voltage, current drain and power consumption, the three simple tests which will diagnose most cases of electrical trouble. In fact, practically any household electrical appliance that has a motor or a heating element, can be tested by the 390, as well as certain industrial installations.

You merely plug Model 390 and appliance to be tested into the Break-In plug furnished—voltage will read. To read watts or amperes, simply press one of the two buttons at bottom of the panel.

Aside from its unique features, Model 390 has no equal among appliance testers in quality alone. The famous Simpson quality makes investment in the Model 390 an investment that will return a rich yield in satisfactory service through the years.

USE MODEL 390 FOR TESTING

Refrigerators	Motors
Deep Freezers	Electric Heaters
Washing Machines	Radio Sets
Irons	Lamps
Toasters	Vacuum Cleaners

and all similar appliances

Ranges—A.C. Current, 60 cycles
Volts: 0-150, 0-300.
Amperes: 0-3, 0-15.
Watts: 0-300, 0-600, 0-1500, 0-3000.
Size: 3" x 5⅞" x 2½". Weight 1½ lbs.
Shipping weight 3 lbs.
Price, with Break-In plug and leads $39.50
Leatherette carrying case, with leads compartment..... 4.00
Genuine leather carrying case, with leads compartment..... 8.00

Simpson Model 390
Volt-Amp-Wattmeter

SIMPSON ELECTRIC COMPANY
5200-5218 W. Kinzie St., Chicago 44, Ill.
In Canada Bach-Simpson, Ltd., London, Ont.

Simpson
INSTRUMENTS THAT STAY ACCURATE

Every seaman knows that an iceberg must be approached with caution. It's never safe to travel between the towering sides of the "drydock" type, for they are joined beneath the surface of the water.

Traffic *must* flow through the openings of man-made refrigerated spaces, however, and this demands the ease of operation and effective sealing properties of Jamison-built Cold Storage Doors. The specifying of Jamison Doors is routine in the refrigeration, cold storage, and frozen food industries . . . and has been for more than half a century, during which Jamison has paralleled the development and anticipated the needs of these industries.

The Jamison standard line . . . Jamison, Stevenson, Victor, and NoEqual Doors, and related products . . . covers all normal needs of the industry. Highly specialized design and rugged, painstaking construction have made the Jamison name world-famous. Jamison-built doors of special design and construction are supplied for exceptional uses. For full information and address of nearest branch, write Jamison Cold Storage Door Company, Hagerstown, Maryland.

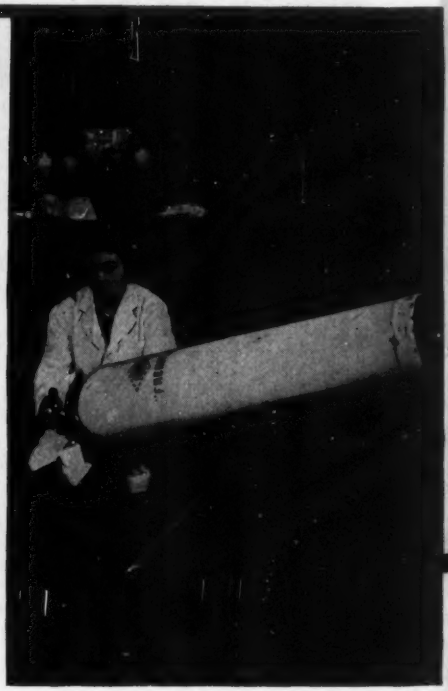
Branches in Principal Cities, Coast to Coast

JAMISON
COLD STORAGE DOORS

NOW...Amazing Dryness

MAKES NEW LOW-TEMPERATURE REFRIGERATORS

Control samples of "Freon" are regularly taken from the production line.



Sample of the finished product is drawn from 145-pound cylinder for qualitative analysis.

This ton drum of "Freon" contains only about one-third of an ounce of moisture!

Technician feeds "Freon" sample through infra-red beam as spectrophotometer dial records moisture absorption of the ray.

of "FREON"

POSSIBLE AND PRACTICAL

Samples analyzed with infra-red rays prove "Freon" refrigerants contain almost no moisture

"Freon" refrigerants have long been known for exceptional dryness. Now, to meet the need for lower temperatures to store frozen foods in household quick-freezers and locker plant refrigerators, they are made drier than ever before . . . containing less than 10 parts moisture in a *million* parts of "Freon".

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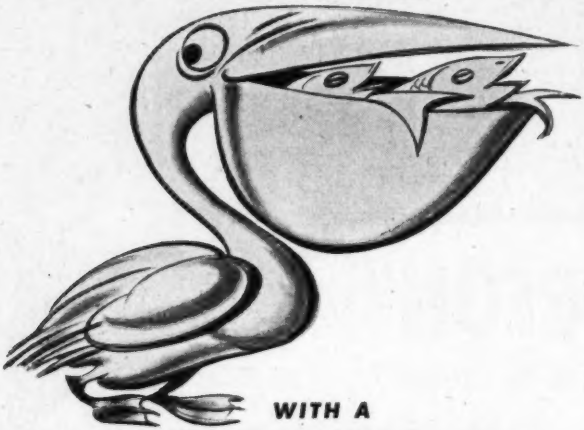

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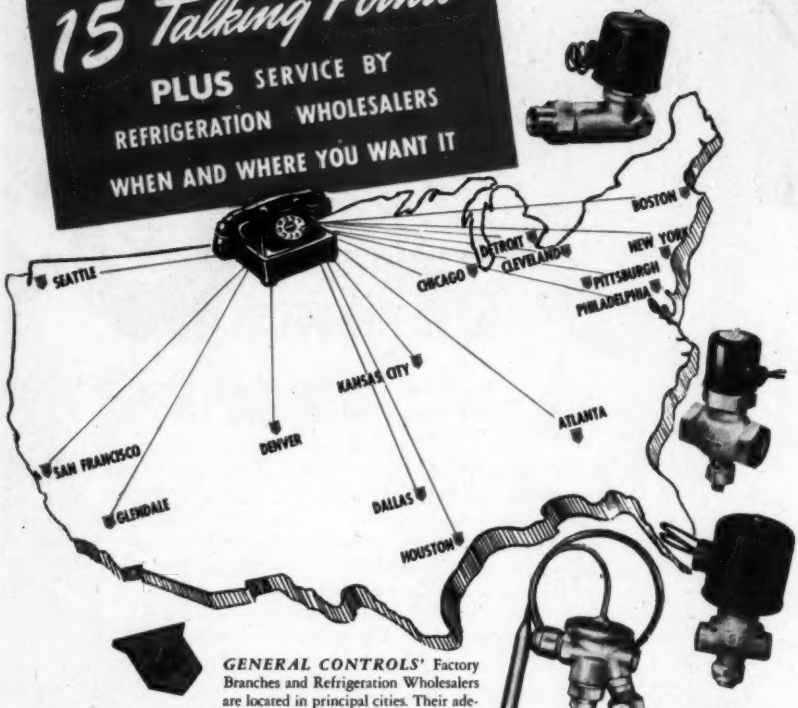

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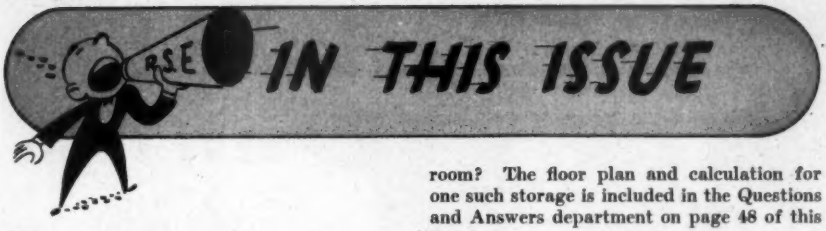

DONALD F. DALY, in his series of articles "Take the Guess Out of Estimating," discusses in this issue the various factors such as your local conditions, efficiency of your organization, etc., which may influence the amount of labor required to make an installation. He then offers an interesting formula for estimating the total labor cost on the job. The factors of the formula may change with experience on various classes of work, but until that experience is gained the method he suggests offers some measure of safety in figuring this most difficult part of an estimate. The article appears on page 31.

NEXT to your knowledge of refrigeration and its problems, the technology of foods is perhaps one of the leading requisites of your job, because food represents the major product preserved with refrigeration. Concluding his article "Things We Need to Know About Foods," Donald K. Tressler, this month on page 35, writes on the freezing preservation of foods, the process and preparation for freezing.

THE concluding article on "The Hermetic Line of Kelvinator and Leonard Units," appearing on page 40, brings this information up to and including the 1946 line, with wiring diagrams and constructional changes in the system. The May issue included oil and refrigerant data on these units.

A ONE page picture story on page 46 contains many pages of information on the construction of zero storages. If you should come in contact with the problem of constructing a cold storage room of this type, the plans included will prove helpful.

WOULD you like to know how to calculate the heat losses for a Turkey storage room? The floor plan and calculation for one such storage is included in the Questions and Answers department on page 48 of this issue.

ONE of the Service Pointers appearing on page 52 describes one of the reasons for failure in Westinghouse units and suggests a remedy.

THE time is not far off when real selling will again have to be done if you are to get your share of the business of your community, and the presentation of neat appearing, easily understood agreements will be helpful. One such agreement form is described and illustrated on page 54.

THE piping arrangement of an ice skating rink is quite expensive and once installed is expected to last for quite a number of years but in order to do so, certain precautions should be taken. The precautions are outlined in an article appearing on page 60.

THE first exhibition and annual meeting of the RSES California State Association was a success, setting a pattern for more to come in the years to follow. A full account of the meeting and many pictures of the social affairs and individual exhibits begins on page 66.

COVER

OUR front cover is a view of the piping under the ice rink of the Rockefeller Theatre, New York, N. Y. The rink is installed on the stage of the theatre. 13,000 feet of pipe is required to permit proper freezing of the skating surface.

Nearly all the earlier installations of skating rinks employed brine circulating systems to freeze the ice, and it is in these systems that periodic tests should be made to avoid excessive corrosion of the pipe. See the article contained on page 60 of this issue.

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By DONALD F. DALY

BEFORE starting a general discussion of the various methods of figuring costs and percentages it might be a good idea to take this Blank Cafeteria job and show one way of arriving at a price for an installation when all of the figures necessary to the estimate are at hand. After this has been done we can go into the several components that enter into making up an estimate.

It should be understood that the terms used in this break-down are for purposes of discussion only. The same thing holds true for the prices in the material lists. They were taken from the latest catalog available at the time this was written, but they may be way out of line by the time this is published. I present this material with fear and trembling. For I know I tread on controversial ground. Oh well. I've stuck out my neck before and lived to tell about it.

At the end of the estimate sheet for the Blank Cafeteria job we find the following totals.

Total cost of material and equipment	$1789.05
40% mark-up on cost of material.	715.60
2% mark-up for incidentals....	50.09
10% mark-up on selling price of material for labor.....	250.40
3% State sales tax on selling price of material.....	75.14
Sub-contract for cement work: motor base, patching, floors, etc.	
$80.00 plus 10% for invoicing....	88.00
Sub-contract for electrical work: motor, fans, solenoid circuits, etc.	
$160.00 plus 10% for invoicing...	176.00
Total cost of installation.....	$3144.28

Now for a discussion of the various parts of the bid and a breakdown of how these figures were obtained.

Cost of Material

Regardless of how an estimator goes about figuring a job, he is bound to arrive at the same result you will get in figuring the material. After all, it takes so many valves, fittings, blower coils, condensing units, and other parts, to do the job. So, unless an estimator misses something, his list will be an exact duplicate of yours. It may be that some contractors have connections where they can buy material at a lower price than you can, especially if they are able to buy in large quantities. But as a rule this advantage is slight and will have very little effect on the amount of the bid.

Mark-Up on Cost of Material

Here is where friendship ceases and all bets are off. 40% is a good round figure and a fair one, and if all contractors would stick to 40% the life of an estimator would be a happy one. Unfortunately there are as many ideas about what constitutes a fair mark-up as there are contractors. The three things that enter into the amount of mark-up you will need to show a profit are as follows:

Third Article

Continuing with his discussion on estimating the cost of installing a medium sized commercial system, the author in this article takes up the very controversial question of mark-up on material, estimating labor costs and mark-up on sub-contractors' work.

1. EFFICIENCY OF YOUR ORGANIZATION. If you are a sharp operator; do most of your own work or have well trained mechanics, you might be able to operate on a material mark-up as low as 10%. But if you have a poor organization, depend on sloppy estimating, and have to hire all of your work done, you might need a mark-up as high as 75%. In this method of estimating it is assumed that the contractor does all, or most, of his own work. The only profit shown is in the 40% mark-up on the cost of the material, plus the amount that is figured for labor. For instance, on this particular job you would have a chance to make, if your estimating was correct, $715.60 on the material. Plus $250.40 on the labor. For a total of $966.00. Out of this you will have to pay for any additional labor, any oversights,

delivery and trucking charges and overhead. If all goes well you should be able to turn this job out in about twenty days. And believe me, brother, they won't be eight hour days.

2. COMPETITION. The second important factor to be considered in rating your organization is the quality and quantity of your competition. The refrigeration contractor has all shades and forms of competition to deal with. It comes from well established firms, and from guys who are operating out of their garages and from the back of their cars. After a man has been in business for a while he is able to evaluate his competitors pretty well. If

Know your competition!

he is up against a few conservative operators who do good work and expect a fair return on their investment, it probably won't be too tough.

But if you happen to be up against a bunch of cut-throats you have your problems and they are not simple. The best thing to do is sit tight and let these sharp-shooters eliminate themselves. They always do, sooner or later, but while they are in business they make it tough for every legitimate contractor. To try to compete with them is ruinous to the conscientious operator. If such a contingency develops in your territory, play it close to your belt until the wildman comes to his senses, or goes broke. In some cases you will have built up a clientele that will stick by you regardless. More and more refrigeration owners are being educated to the fact that they get about what they pay for. And with a little expert salesmanship you can ride out these bad periods.

3. CONSCIENCE. The third factor to be considered is the contractor's own conscience. If you start out to follow sharp-shooting practices be careful you don't shoot yourself in the process. A refrigeration contracting business must be based on the very highest business ethics if it is to live and grow. Any other approach is foredoomed to failure. The responsibility of the refrigeration contractor is great and matters of public health are involved in every job he installs. He should have the same regard for this trust that Doctors have for their Hippocratic oath. Pretty highfaluting talk, but it happens to be the truth.

It sometimes occurs that refrigeration contractors have so won the confidence of his customer that the customer gives him a free hand. Not only in selection of material, but on the installation as well. The work is done on a cost-plus basis and no questions are asked. In such instances the contractor is duty bound to give his customer the best possible service at the lowest price that will allow him a fair profit. Such a course of action will pay rich dividends in the way of satisfaction for a job well done, and will pave the way for a long and successful business career.

2% Mark-Up for Incidentals

Some estimators frown on the use of this device, claiming that it is a subterfuge and should rightly be shown under cost of material or under overhead. They may be right, but it does offer one way of estimating this factor and shorten somewhat the work of listing in detail all of the minute items that go to make up what is known as installation material. It would be a tedious job to list every bolt, nut, screw, hanger, nail, silver solder, flux, emery paper, oxygen and acetylene. and all the other things that are required to complete a refrigeration installation. By taking a percentage of the whole material cost it is possible to arrive at an approximate cost for such materials. In some cases 2% may not cover the cost of such materials. It might run as high as 5%. Whatever method is used in figuring this factor, it should never be overlooked in making a bid.

Estimating Labor Costs

Estimating the amount of labor that will be required to do any given job is probably the most difficult part of the whole estimating job. There are so many operations involved that it just isn't possible to break each one down separately. However, most contractors who are just starting out in business have been working as service engineers for several years and have had considerable experience in

such work. Even if they have not had time to build up a store of job records, they can still give a pretty close estimate of the time required to do a certain piece of work. If the contractor has to depend on hired labor the problem is somewhat different. You can't expect a man, hired casually, to take the same interest in a job that you would take. Then, too, efficiency of workers varies so much that the average amount of work that can be expected for so many paid man-hours will vary considerably.

On the Blank Cafeteria job I have taken an arbitrary figure of 10% of the selling price of the material. That is, your cost plus a mark-up of 40%. Some operators will hold that the 10% figure is too low. That the factor for labor should be at least 15% and in some cases even higher. This is undoubtedly true. Labor costs vary from job to job, and in some cases labor might run 25% or more. But before we discuss this further let's see how the actual labor costs, taken from the time book of the mechanic who did the job (namely me), stacks up against this arbitrary figure of 10%.

Actual and Estimated Labor

Breakdown of Work	Man-hours
Shop fabrication of dryer strainer manifold, etc.	8
Setting condensing unit & hanging condenser	16
Hanging and hooking up blower coils	48
Running lines from basement to cafeteria	16
Running pipe in compressor room	32
Running fire and water lines	8
Putting up hangers	16
Drying system, testing for leaks, etc.	16
Running tests and proving job	16
Total man-hours	176
Total cost of labor at $1.75 per hour	$308.00
Estimate for labor using 10% cost of material	$250.40
The actual cost for labor	308.00
Loss on labor	57.60

While there is certainly room for argument about using an arbitrary figure in estimating labor costs, still the loss of $57.60 on this job is not too far off and if you never miss any further than this, you will be lucky. In order to have come out on the labor for this job the contractor should have figured at least 12%. Which would have brought his labor estimate up to $308.48. I believe that the use of a percentage of material cost as a basis for figuring labor should be considered in every estimate. At least as a means of checking the figures that you obtain from your job record sheets.

A great many things enter into figuring the labor requirements for a job, and since it is the principal unknown factor, much care should be spent on this part of your estimate. Before making a labor estimate on an installation where the building has already been built, if it is a new building and you have to submit a bid before the building is completed, you will have to depend on your experiences on previous jobs. Make a careful check of the following conditions: Location of the unit, coils, piping, type of building (frame or concrete construction), length of piping runs, and every other detail.

Penetrations through walls take extra time and should be noted.

If the unit is to be installed in some inaccessible location with little room to work and poor lighting; if the refrigerated spaces are small and cramped, the time required to do the installation will be longer. If the building is of steel and concrete construction, that means more time will be needed to install the pipe hangers, coil hangers, and to make the penetrations through the floors and walls. It should also be noted if the penetrations for the copper tubing to pass through the walls of the boxes are already

in. If they are not additional labor time should be allowed. It takes time to make penetrations through partitions. Even wooden partitions, and if you have to make penetrations through concrete walls and floors the percentage for labor must be upped considerably. Then too, if some section of the plant must be kept in operation while the job is under construction, time will be lost.

There are probably a lot of things not listed here that will enter into your labor estimate, but if the contractor will follow the procedure shown in this break-down he will be basing his bid on real evidence and not on guess work. Until such time as the contractor can accumulate enough job cost records from his own experience as a guide, he would do well to use some method such as this.

Figuring Mark-Up on Material

There are a number of ways to figure profit and overhead percentages. Some estimators use the method shown in this break-down of the Blank Cafeteria job. Some prefer to figure the mark-up on the selling price of the material. Others figure their overhead and profit separately. Still others figure a percentage of the entire cost of the job. But, however you figure it, you come out just about the same place. After all, the idea is to operate at a profit. The amount of profit that can be made must rest somewhere between how much your competition will allow you to make, and the contractors own conscience.

The following examples will be of help in figuring percentages and the tables will enable the estimator to figure his mark-up on any percentage of overhead and any percentage of profit he thinks he can get.

Mark-Up on Purchase Price Equivalent to Percent Profit on Selling Price

For Profit of	Mark-up Cost by
%	%
25	33
30	43
35	54
40	67
50	100

Examples of How to Use Tables

Suppose you bought a unit for two hundred dollars. Your cost of doing business (Percentage figure at extreme left hand side of table) is 15%. You want to make a net profit of 25%.

Cost of unit.....$200.00
Cost of doing business...15%
Desired profit 25%
Total mark-up 40%
$200.00 x 1.67.....$334.00

Now let's reverse the process and see if the results did work out to 40% of the selling price.

$334.00 x .40.....$133.60

Since the mark-up on the $200.00 item was $134.00, and 40% of your selling price amounts to $133.60, the mark-up factor is approximately correct.

Let's try another one:

Cost of material.....$750.00
Cost of doing business....18%
Desired profit 20%
Total mark-up 38%
$750.00 x 1.61.....$1207.50

Sales Tax and Building Permits

A great many states have some form of sales tax and the contractor should not overlook this in making up his bid for it amounts to a sizable chunk of money. In the case of the Blank Cafeteria job $75.14. This amount is too large to be charged off against incidentals. It would also be advisable to find out the cost of building and fire permits. Usually they are nominal, but it may be that in some cities they are large enough to make a difference in your bid. At any rate it will take time to get these permits and they should not be overlooked. If you fail to get them a penalty may be involved. Another point that should not be overlooked is building codes. More and more cities are using a building code for refrigeration installations above a certain horse power rating. If you go ahead with the work, and then find that the job is not in accordance to the code, expensive alterations may be necessary.

(Continued on page 88)

Selling Price at Desired Profit and Varying Overheads

Percent	Desired net profit in percentage					
Overhead	7	12	15	20	25	35
15	$1.28	$1.37	$1.43	$1.54	$1.67	$2.00
18	1.33	1.43	1.49	1.61	1.75	2.13
20	1.37	1.47	1.54	1.67	1.82	2.22
22	1.41	1.52	1.59	1.72	1.89	2.33
25	1.47	1.59	1.67	1.82	2.00	2.50

Second Article

Last month the author of this article discussed the causes of deterioration, the storage temperatures, proper humidities and approximate length of storage of various foods. In this article he discusses the frozen storage of foods, preparation of foods for freezing and freezing processes.

Things we need to know

About Foods

By DONALD K. TRESSLER*

Frozen fish ready for glazing. The water is kept at a temperature just above freezing. Frozen fish are dipped in water and glazed.

Cold or Frozen Storage

LET us define cold storage as holding products at a temperature of 15 F. or lower. It used to be thought that freezing would destroy bacteria, yeasts and molds. Nothing is further from the truth. It happens that in fruits and fruit juices it does destroy a large proportion of them, but even in fruit juices a few survive. In most fruits, while freezing may cause a destruction of perhaps one-half of the total bacterial content of the food, it does not at all sterilize the food.

Nevertheless, at temperatures below freezing, especially at 0 F. or below, commonly used for storage of frozen foods, mico-organisms (bacteria, yeasts and molds) do not multiply fast enough to cause damage. In the freezer (or low temperature storage) we are concerned only with deterioration caused by desiccation, oxidation, and other chemical changes and certain enzymic actions.

Twenty years ago frozen foods were considered to be foods of relatively poor quality. In the eyes of the average housewife, they were in a class with cold storage eggs, or even below cold storage eggs in quality. The prejudice against frozen foods was so severe that prior to 1930, the grocer could not sell foods in the solidly frozen condition to the housewife. Large quantities were thawed and sold as fresh foods. The average housewife did not understand that if she bought ocean fish in the interior of the country, the chances were about 5 to 1 she was buying fish that had once been frozen and then thawed in the back room of the meat market or fish market. Unfortunately, that slow thawing and the fact that the product laid around above 32 F. for a period awaiting sale caused a considerable deterioration of the food.

Another point is that in the early days in the industry, back prior to the introduction of Birdseye Frosted Foods (prior to 1927), little thought was given to the quality of the food selected for freezing or to the method of freezing or to the method of packaging employed, and further the temperatures maintained in the cold storage room were not what they should be. For all of these reasons the quality of the frozen foods produced prior to about 1927, was not what it should have been. The quality was relatively poor.

Now consider today—frozen foods packed in individual packages have attained a very high reputation. I know there are many housewives who buy frozen foods regularly in preference to fresh foods, even when the fresh foods are in season.

What has brought about that change? I think Mr. Clarence Birdseye did more than anyone else to bring about that change because he was convinced that foods would retain their original freshness if sufficient pains were taken in the selection of the foods to be frozen and if they were prepared and cleaned carefully, then packaged right so that they would not deteriorate markedly during storing, and frozen rapidly, then held at a sufficiently low temperature and main-

* Consultant, Westort, Conn. Paper delivered to RSES annual convention in Cleveland.

Cod fish, cleaned, packaged and frozen ready for shipment are held in the frozen state on these freezer shelves of a cold storage room.

tained in a solidly frozen condition until the time they were sold to the housewife. More important, he believed that the housewife could be induced to buy those foods in the solidly frozen condition. He felt, however, if they simply called them frozen foods that the housewife would not buy them because she was prejudiced against them. He coined the term quick-freeze and "frosted foods." Quick freezing is one reason for high quality in frozen foods but is only one of many reasons. The careful selection of raw material and all these other points that I have mentioned are of just as great importance as the rate of freezing of the food.

Needless to say that today the frozen food industry is an established industry and is going forward. If the packers of frozen foods and the distributors and the retailers will just remember that it isn't only the method of freezing that puts the quality in the product but it is the selection of the raw material, the packaging and the maintenance of that low temperature at all times up until the product reaches the housewife, then the industry will move ahead rapidly.

There are many distributors who do not maintain frozen products at zero or lower at all times. During transportation across the country the temperature may rise to 20 degrees. Then the quality drops. There are many retailers who seem to think, "Oh, well, this product is all going to be sold today. It is going to be thawed tonight and eaten on tonight's table. What if it does partially thaw?"

More important than anything else in this whole frozen food system is the maintenance of zero degrees F. at all times from the time that product is frozen until it reaches the housewife.

Freezing Processes

In general, there are two types of processes, one called sharp freezing and one quick freezing. Sharp freezing is usually brought about by placing the food in a room maintained at minus 10 F. or below. Sometimes an air blast is used to help speed freezing. As a rule the products are in relatively large containers and the food is frozen in a period of from 12 to 24 hours. Large carcasses of beef may require 48 or even 72 hours to freeze.

There is one other type of sharp freezing. It is a system of freezing used in the fish industry. There the products are placed in pans, usually containing about 30 pounds of fish. The pans are placed directly on —10 F. ammonia coils, and the food freezes fairly rapidly.

We have also quick freezing. In the case of some processes, for example, the Birdseye process, the product is put in small packages, which are placed between movable metal plates maintained at minus 25 F. or below. The heat is rapidly conducted from the product and the product is frozen in from 1 to 3 hours.

In one process the product is packaged and then placed on very cold plates in an air blast. That is called the Murphy system. In that, rapid freezing is obtained because you get good conduction of the heat from the product and good convection due to this air blast blowing over the product.

In general, we can define quick freezing as freezing by any process which freezes the product in less than three hours, and if the product is frozen in a longer period of time than three hours it may be called sharp freezing. This is merely to draw a line for purposes of discussion.

Rapid freezing may be obtained by freezing by immersion. If, for example, strawberries or raspberies are dropped into a very cold brine or syrup or dipped into a brine maintained at zero degrees F. or lower, they will be frozen very quickly.

The Preparation of Foods for Freezing

Large quantities of meat are frozen. Much of it (offal meats, liver, kidneys, hearts, sweetbreads and brains) are frozen in order to permit shipment and distribution without loss by spoilage. A considerable quantity of pork is frozen for cure later into hams, bacon, etc.; this eliminates the necessity of curing the pork soon after slaughter. Some quarters, halves and whole carcasses are frozen, later to be thawed and sold as "fresh" meat. This helps to make the supply uniform throughout the year. Some meat is boned, packed and frozen in fifty-pound

cartons for use by the armed forces. A small amount is cut into retail size cuts, packaged in small packages and frozen for sale in the solidly frozen condition from retailer's cabinets.

In general, the meat cutters' union is not anxious to see the meat cut in the packing plants. Union members would rather have it cut in the butcher shops. They feel if it is cut by mechanical means in packing plants, some meat cutters may be put out of work. That may be, but in the end I think meat cutting in the packing plants is bound to come because it is more logical to have meat neatly packaged and maintained under ideal conditions of storage at all times and then sold to the housewife in trademarked packages rather than to have it brought in in quarters or halves or whole carcasses to the meat markets and cut up there.

The handling of the pre-packaged meat is more sanitary and further, the housewife prefers it because she can send Johnny to the store and say, "buy me three pounds of tenderloin steak of a given brand," and she knows she will get a certain quality.

Meat is not changed greatly by freezing. However, during storage it may desiccate. This causes loss of flavor and moisture and permits the development of rancidity in a short time. For this reason meat should be packed in moisture-vaporproof packages **before** freezing if the product is to be kept for more than a few weeks. Meat needs no other preparation for freezing.

Poultry

Since more poultry is marketed in the autumn than during any other season of the year, large quantities of poultry are frozen in order to make the supply uniform. Prior to 1930, frozen poultry was all dressed New York style—that is plucked and with the "feet" cut off, but not eviscerated. In those days it was believed that frozen eviscerated poultry would not keep in storage as well as that which had not been eviscerated. Now we know that frozen eviscerated poultry retains its quality even better than that which has not been eviscerated; moreover, the public will now buy eviscerated poultry in the solidly frozen condition.

Poultry needs no special preparation for freezing other than the preparation necessary for cooking, which is plucking, cutting off the feet and preferably the head also, evisceration and packaging in moisture-vaporproof packages. Proper packaging is especially important because deterioration in cold storage is rapid if notable desiccation occurs. If the protective film of moisture evaporates, the layer of fat just under the skin of the birds is exposed to oxidation by the air and soon becomes rancid.

Neat stacks of crated products and clean, smooth surfaces on floor and walls are important to order and sanitation in cold storage rooms.

Fish

Fresh fish are highly perishable and soon become stale unless preserved by freezing. Many of the improvements in freezing foods were originated for the purpose of better preserving fish. Brine freezing and most of the other quick freezing systems were invented for the purpose of producing better frozen fish.

Large quantities of small-sized whole (round) fish are frozen in shallow rectangular galvanized iron pans. The pans, each filled with about thirty pounds of fish arranged in an orderly manner, are placed on refrigerated coils constructed so as to form shelves. After the pans of fish have been on the refrigerant coils for about twenty-four hours, they are placed in a vat of cold water for a moment. This loosens the cake of fish which is then removed from the pan; a thin film of ice (a glaze) forms over the surface of each fish and this glaze forms a protective coating against desiccation and oxidation. The cakes of fish are stacked like cordwood in a freezer maintained at 0 F. or below. From time to time they are sprinkled with water in order to renew the glaze which sublimes during storage. When desired for sale, the cakes of fish are packed in heavy wooden boxes for shipment.

Larger fish are usually frozen by placing them on galvanized iron sheets arranged on the refrigerant coils in a sharp freezer. These fish are also protected from desiccation by glazing before storage.

Large quantities of fish fillets and steaks are frozen. Haddock, cod, sole and rosefish fillets are particularly popular. Salmon and swordfish are commonly cut into steaks. Fillets of lean fish are usually dipped in salt brine before wrapping either in moisture-proof cellophane or specially coated vegetable parchment. The brine dip is for the purpose of preventing the drip or leakage which would otherwise occur when the fish are thawed. The wrapped fillets are packaged in cold waxed cartons or other boxes usually holding five or ten pounds. Then they are frozen in a special quick-freezing apparatus, such as a Birdseye multiplate freezer, or in a sharp freezer, either of the type used for panned fish or simply by stacking or placing the boxes of fillets on racks in an airblast freezer.

Shellfish

Large quantities of shrimp are frozen in this country. Some scallops, clams, oysters, crabmeat and lobster meat are also preserved by freezing.

Shrimp are frozen both before and after cooking. Cooked shrimp toughen during freezing and subsequent storage; consequently most of the strimp is merely headed, packaged in rectangular 5 and 10 pound cartons and frozen, usually on refrigerated coils. If the shrimp are packaged in moisture-vaporproof packages, they need no other treatment other than packing into shipping containers for storage. In case moisture-vaporproof cartons are not used, the frozen shrimp are usually glazed by brushing it with water.

Cooked shrimp are usually peeled and sometimes also deveined before packaging in moisture-vaporproof packages for freezing.

Only the "eyes" (adductor muscles) of the scallops are frozen. Many different types of packages are used, the kind of package depending largely upon the market in which the product is to be sold.

Clams and oysters are shucked, thoroughly washed and then packed in small moisture-vaporproof cartons for freezing.

Dairy Products

Ice cream is not only the most important dairy product frozen in the United States but also the food frozen in greatest quantity. Frozen desserts include not only ice cream which contains from 12 to 14% butter fat, but also iced milks, which are similar in composition to ice cream but contain less butter fat; frozen custards and French vanilla ice creams (ice creams containing eggs); ices (fruit juices, sugar and flavor); and sherbets which are similar in composition to ices but also contain milk. At one time it was believed that low temperatures and rapid freezing damages ice cream; now it is generally recognized that ice cream of high quality should be rapidly frozen and then stored at a low temperature.

Cream is frozen in large quantities for use later in making ice cream and for other purposes. Unfortunately, good methods of freezing cream are not employed. Why I don't see, because cream is one of the most valuable products frozen. It should be frozen very, very rapidly, after having been pasteurized at high temperature to inactivate enzymes, and held in air-tight containers at very low temperatures. Usually cream is simply pasteurized by ordinary methods, put into large 30 or 50 pound tin cans and frozen. Because frozen cream is not properly prepared and frozen, it usually has a strong taste. It is practically impossible for the housewife to use because it is more like butter in consistency. It resembles cream which has been partly converted into butter.

Much butter is held in storage at temperatures of 0 F. or lower. Frozen butter will remain free from rancidity much longer than butter stored at higher temperatures.

Eggs

Most people do not realize the large quantities of eggs that are frozen, usually in 30 to 50 pound cans. That industry has grown very rapidly. Egg white freezes without any special treatment and is practically indistinguishable from white which has not been frozen. The yolks, unfortunately, jell if the temperature goes below 23 F. For that reason, the yolks are usually mixed with a little sugar, corn syrup, salt or glycerin, and this, of course, limits the use to which those yolks can be put. Mixed whites and yolks (whole eggs) become more viscous on freezing and thawing but do not actually jell.

Fruits

Large quantities of fruits are frozen. Formerly strawberries, raspberries and other berries and cherries made up the bulk of the pack, but in recent years the pack of apples, apricots, and peaches has

grown to large proportions. As a rule, fruits must be protected from oxidation (action of the air) during freezing and storage. Sugar and sugar syrup is commonly used to prevent intimate contact of the air with the fruit. Sometimes the fruit (strawberries, or other berries and cherries) is packed whole with dry sugar. In other cases the fruit is sliced or cut into halves and then either mixed with dry sugar (in the case of sliced strawberries) or covered with syrup, either cane sugar syrup or Sweetose. During the past few years peaches and apricots have been protected from oxidation by the addition of ascorbic acid (pure vitamin C) to the syrup. As a rule frozen fruits should be stored at 0 F. or preferably lower.

Fruit Juices

Considerable quantities of orange and some other fruit juices are preserved by freezing. One important procedure used in freezing large quantities of citrus juices requires the packing of the deaerated juice in enamel-lined tin cans or glass jars. The cans of juice are then passed through refrigerated alcohol in a tubular freezer.

By another method the juice is first frozen to a slush in an ice cream freezer with beater arms removed. The slush is packaged and hardened at a low temperature, usually with an air-blast to hasten freezing.

Recently, some orange juice has been concentrated, either by freezing out the water and removal of nearly pure ice, or by a vacuum process, and then packaged and frozen. The frozen concentrate possesses the advantage of being readily removable from the container and being easily thawed by the addition of water.

Vegetables

Vegetables are now frozen in very large quantities; the industry is growing so rapidly that it may soon rival canning as a method of preservation for this product.

The methods of preparing vegetables for freezing are quite similar to those used in preparing vegetables for canning. In general, the vegetables are prepared for the table (corn is husked, then cut from the cob; peas and lima beans threshed; snap beans snipped and cut up, etc.) Then the products are carefully washed and blanched (given a precooking treatment), after which they are thoroughly cooled. According to some procedures, the vegetables are frozen on moving belts or on trays and then packaged. Other procedures require the packaging of the blanched, cooled vegetables before rapidly freezing in a Birdseye multiplate freezer, in an air-blast tunnel, or in some other quick-freezing apparatus.

The one thing that is done in all cases is "blanch" or pre-cook the vegetables. That inactivates the enzymes so the product doesn't deteriorate as it would if it were not so treated.

Cooked Foods

Recently, frozen cooked foods have become very popular. The variety of cooked foods now available at any first class frozen food specialty store is very wide, including almost everything from soup to nuts. Some of the products that are especially popular are oyster stew, French fried potatoes, corned beef hash, beef hash, beef stew, creamed chicken and chicken a la king, chile con carne, rolls and unbaked pies.

Future Trends

No one can tell to what the present trend will lead. The widespread use of frozen cooked foods may be largely a fad, or it may continue to expand and grow until it exceeds in importance the food canning industry. We must remember that all canned foods are in reality cooked foods. Further, the canner is much more limited in the number of his products and methods of preparation employed than is the freezer. About the only foods that cannot be frozen satisfactorily are products which are eaten primarily for their crispness, such as lettuce, celery, radishes and the like.

Many problems remain, such as the prevention of curdling of cream sauces, the elimination of "warmed over" flavors from thawed, reheated cooked foods. But with many of the best food technologists studying them, it is doubtful if many of these problems will remain unsolved for long.

* * *

SUCCULENT steaks and tender roasts are flying south of the Rio Grande nowadays to whet the appetites of Mexico City natives and visitors. A recent shipment of 3,000 pounds of frozen meat packed in 28 cartons was dispatched by a Kansas City meat packer to the Mexican capital. It moved by rail express from K. C. to Houston, Texas, where it was transferred to international air express for flight to Mexico City. This particular K. C. meat man reports that he ships meat regularly by air express to East and West Coast customers.

Second Article

The Hermetic Kelvinator and

1939 Models

IN THE 1939 models the unloader mechanism, high-side float and condenser fan are eliminated. The necessity for an unloader is removed with the elimination of the high-side float, by utilizing the characteristics of a small diameter (.031 I.D.) liquid line tube to replace the action of the unloading valve formerly used. The accuracy of equalizing pressure by this method is assured by the precision manufacturing limits over the entire diameter of this tube. Since this liquid line is of the extruded type rather than hard drawn tubing, its entire diameter is held within one-half of one .0001". Therefore its characteristics are only affected by its length. By actual test, under all possible operating conditions for a given compressor, condenser, evaporator combination assembly, the length of this tubing is determined and applied to that particular assembly. The results of these tests and the application of the small diameter tube, creates a condition in the refrigeration system where the condenser pressure and evaporator pressures will be matched for the particular loads imposed, by any reasonable location regardless of the surrounding temperature.

The suction valve reed was redesigned and strengthened to operate with greater efficiency and less chance of breakage in the 1939 models.

The Oiling System

Oil is picked up by the small pump on the shaft end and forced into the lower main bearing. From this point it follows the spiral up to the crankcase where it lubricates the thrust plate, connecting rod and piston. Oil is then pumped to a small reservoir beside the upper main bearing and is then fed into and spiraled up through the bearing, from where it drops back to the sump. Any oil in the refrigerant is sep-

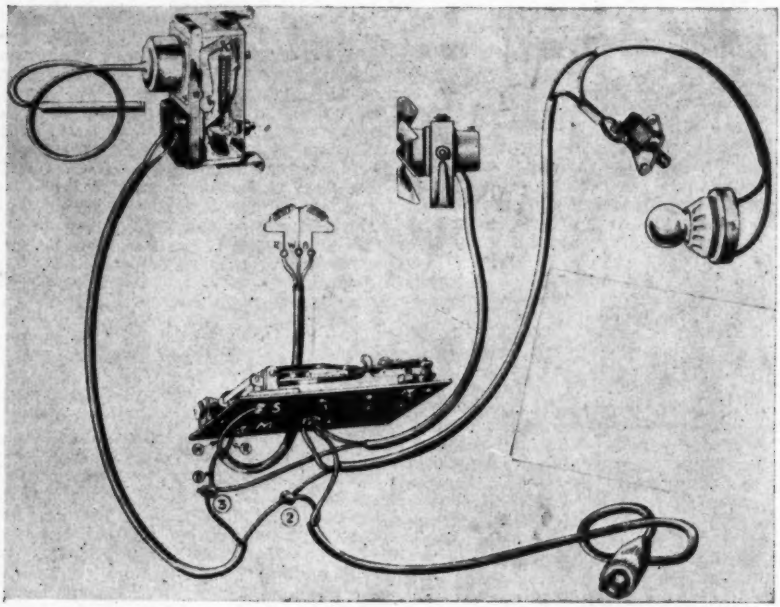


Fig. 8—Late model 1938 wiring diagram which is the same as 1939 with the condenser fan omitted.

Line of Leonard Units

arated by centrifugal action as the vapor passes through the holes in the rotor. This oil cycle effects complete oil separation.

The electrical system employed in the early 1938 units, changed in late units. Late production models included a different type relay as shown in Fig. 8. The 1939 models were the same as late 1938 with the exception that the condenser fan motor was eliminated. Delco hot wire relays were used on these models.

Operation of the Delco Relay

The overload thermal element carries all current going to the condensing unit motor. When this thermal element is carrying no current (thermostat off), both relay contacts are closed. As soon as the thermostat cuts in, the relay contacts which are closed allow the current to flow through both the starting and running windings and the unit starts. The starting thermal element warms rapidly and warps, pulling the contact arm away from the starting winding contact. The running winding contact then remains in a closed position and stays there during normal operation. In this position the starting contact is open and the overload contact is closed. If for any reason the unit should draw excessive current, the increased heating of the overload element causes the thermal overload contact to open and stop the motor.

When the thermostant cuts out after a normal cycle, the thermal element cools and the switch returns to the starting position after a minute or two. After an overload cut out, the relay is in the open position. After a minute or two of cooling both moving contacts return to the starting position. The time required for the thermal overload to reset fluctuates with room temperature. When the thermostat cuts off after a normal cycle or when the switch is turned off, the starting contacts remain open for the length of time required for the thermal element to cool. If the switch is closed during the few seconds interval before the starting contacts close again, the unit will fail to start and the overload will operate. Occasionally a serviceman will take this as an indication of unit failure. It is a normal function of this type of relay.

Checking for Trouble on Delco Circuits

There are four reason for the failure of the sealed unit to run.

1. Failure of power circuit to the wall

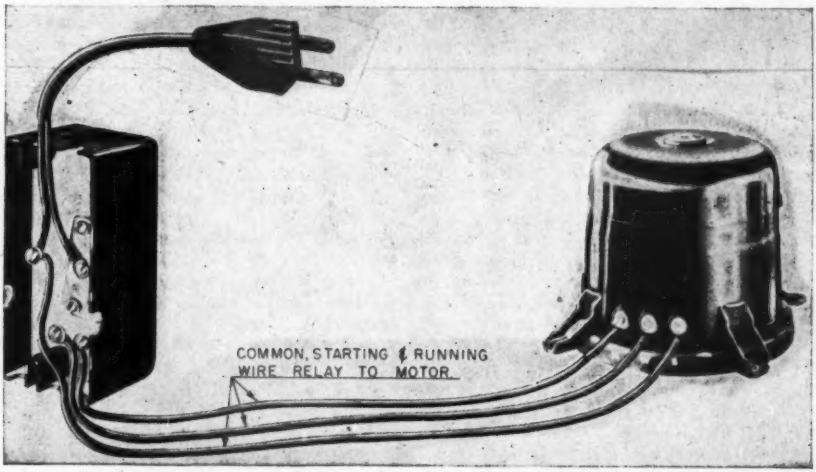


Fig. 9—Testing for trouble in the thermostat. Disconnect wires from the thermostat and replace with two-wire cord and plug for direct connection to power outlet.

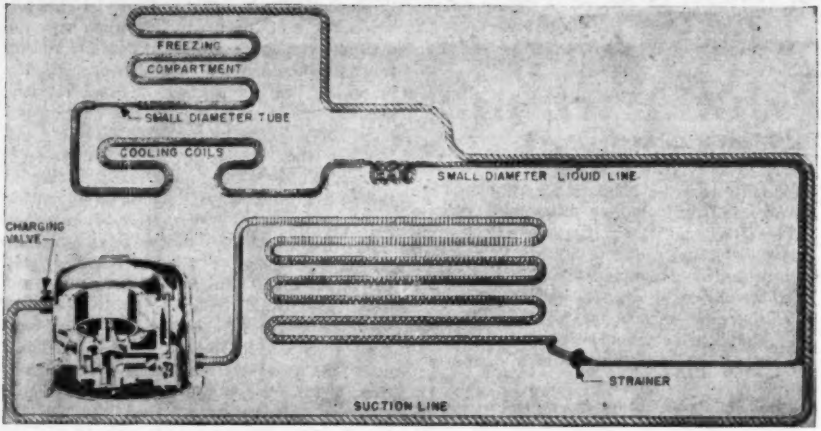


Fig. 10—Refrigerating cycle of the 1940 "HS" and "HD" line.

plug. This failure can be traced to a blown circuit fuse or the plug pulled out of the receptacle.

2. Failure of the thermostat to complete the circuit through the contacts. Cause: Power element has lost its charge or burned thermostat contacts. To test, remove the two wires leading from the thermostat to the terminals on the relay. Connect a two-wire cord to terminals as shown for test relay (Fig. 9). Plug direct into circuit. If the unit operates, then the thermostat is inoperative and must be changed. If it will not run check further as under 3.

3. Failure of relay. If the unit will not operate after the test is given under 2, check for an inoperative relay.

To check for an imperfect relay, a simple piece of test equipment is all that is necessary. Calibrated relays are available and should be a part of every serviceman's equipment. To test for an imperfect relay, disconnect the wire from the three motor terminals and connect the test leads in their place. When the test leads are connected to the circuit as shown, a definite test for relay trouble can be made. If the motor starts with the calibrated relay and does not start with the original relay, a replacement relay should be installed. If the motor does not start with the original relay or the test relay, discard the idea of relay trouble and check through the circuit from the thermostat. Should all tests prove the thermostat, relay and wiring satisfactory, the trouble is internal. Be positively certain that a calibrated relay or a stock relay is in the circuit to protect the motor windings before starting a sealed system.

Do not replace the unit until all of the foregoing tests and checks have been made in connection with the relay and thermostat. The simplest way to check any sealed unit, when there is doubt as to whether or not a unit failure or an accessory failure exists, is to isolate the compressor with your calibrated relay and service cord to see if the compressor will run. If the compressor runs, changing the unit would not help your difficulty. Check the electrical circuit, relay, service cord and thermostat. Be on the lookout for wires with frayed ends, as these will cause short circuiting.

If the compressor will not run with your calibrated relay, check the line voltage to see that there is not more than 10% variation from the normal voltage for which the unit was designed. If the voltage is correct and the unit will not run, change the unit. Be very careful in carrying your calibrated relay, as the slightest shock will ruin its calibration.

4. Shorted or open motor winding. Since no field service can be performed on the sealed unit, there is no reason to determine if the motor windings are shorted or open.

1940 Models

The cycle of refrigeration and the sealed unit was unchanged, except in the HD line and the HS-6. In HS and HD models, the freezing unit is enclosed and isolated from the surrounding air in the food compart-

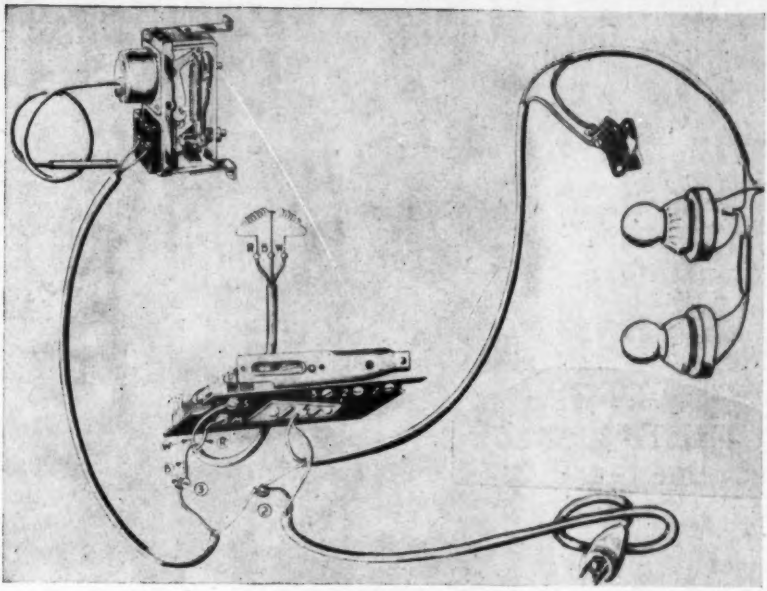


Fig. 11—Point-to-point wiring diagram for 1940 models.

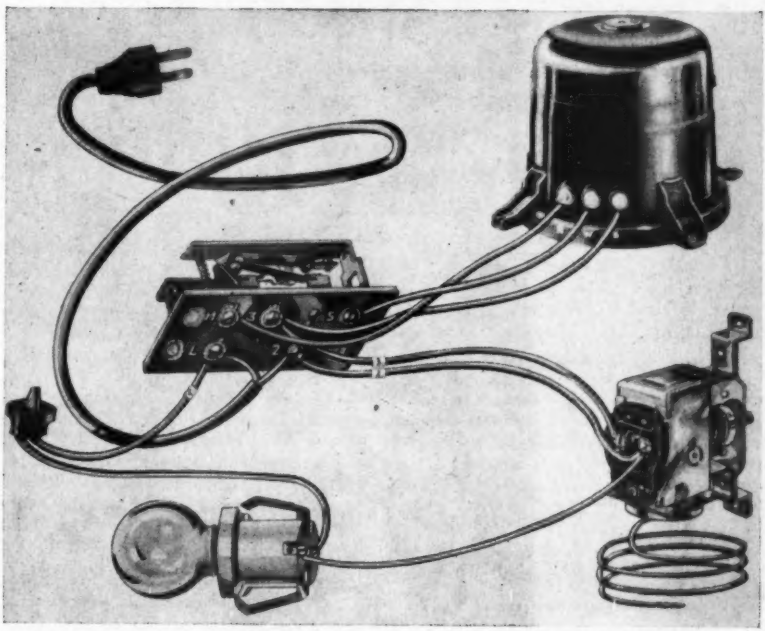


Fig. 13—Wiring diagram for late 1941 models and all 1942 models.

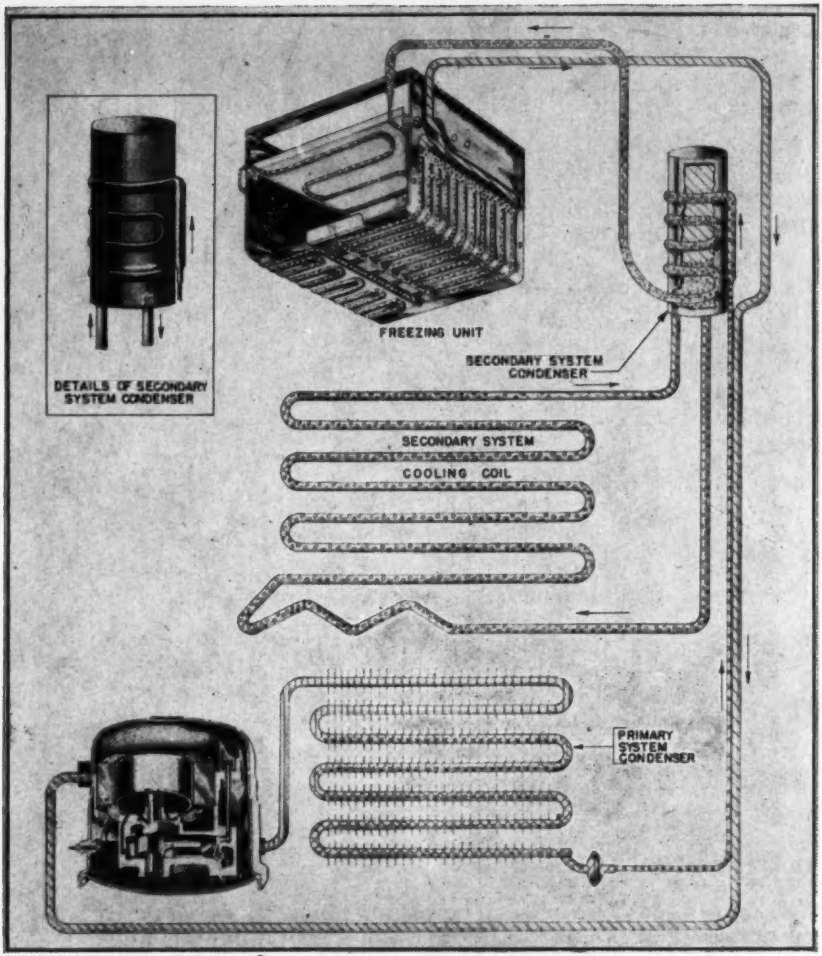


Fig. 14—Refrigerating cycle of Moist-Master and Hi-Humid systems.

ment by a sealed housing with a gasketed door. Fast freezing of ice cubes is assured and frozen meats, game and delicacies can be kept in excellent condition for a long period. The cooling coils are located at each side of the freezing unit against the back of the food compartment liner. The function of these coils is to keep the proper food preservation temperature and humidity in the food compartment. Service on this new system is no different than on the other models.

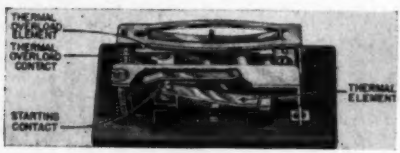


Fig. 12—Thermal relay used on some 1941 models.

The HS and HD System

The compressor pumps the high pressure refrigerant gas into the condenser where it

is cooled and condensed by the cool air passing through the condenser. See Fig. 10. This high pressure liquid then flows through a strainer directly into the small diameter liquid line. The pressure (and therefore the temperature) of the refrigerant is reduced as it flows through this small diameter tube until it passes into the cooling coils at a pressure predetermined by the length and inside diameter of the small diameter liquid line. In the cooling coils, part of the liquid refrigerant boils and is vaporized in the process of cooling the coils. This mixture of liquid and vapor then passes through a short length of small diameter tube leading to the refrigerated shelf of the freezing unit at a still lower temperature and pressure. The refrigerant liquid then boils and vaporizes in the process of keeping the freezing compartment at a low temperature. The compressor draws this vapor from the freezing compartment; compressing it and pumping it to the condenser from where the cycle is repeated.

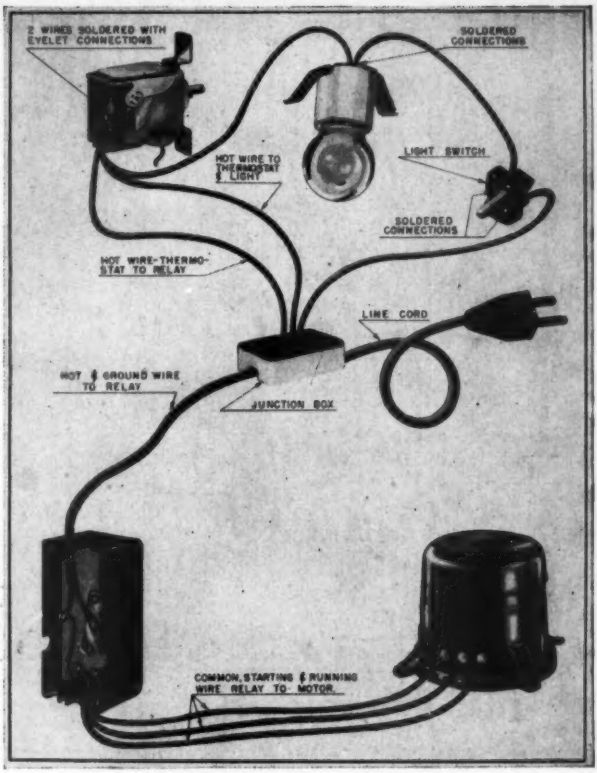

2 WIRES SOLDERED WITH EYELET CONNECTIONS
SOLDERED CONNECTIONS
HOT WIRE TO THERMOSTAT & LIGHT
LIGHT SWITCH
SOLDERED CONNECTIONS
HOT WIRE-THERMOSTAT TO RELAY
LINE CORD
HOT & GROUND WIRE TO RELAY
JUNCTION BOX
COMMON, STARTING & RUNNING WIRE RELAY TO MOTOR

Fig. 15—Wiring diagram used on 1946 models.

A new and improved Delco thermal relay was used on 1940 systems. (See Fig. 11.)

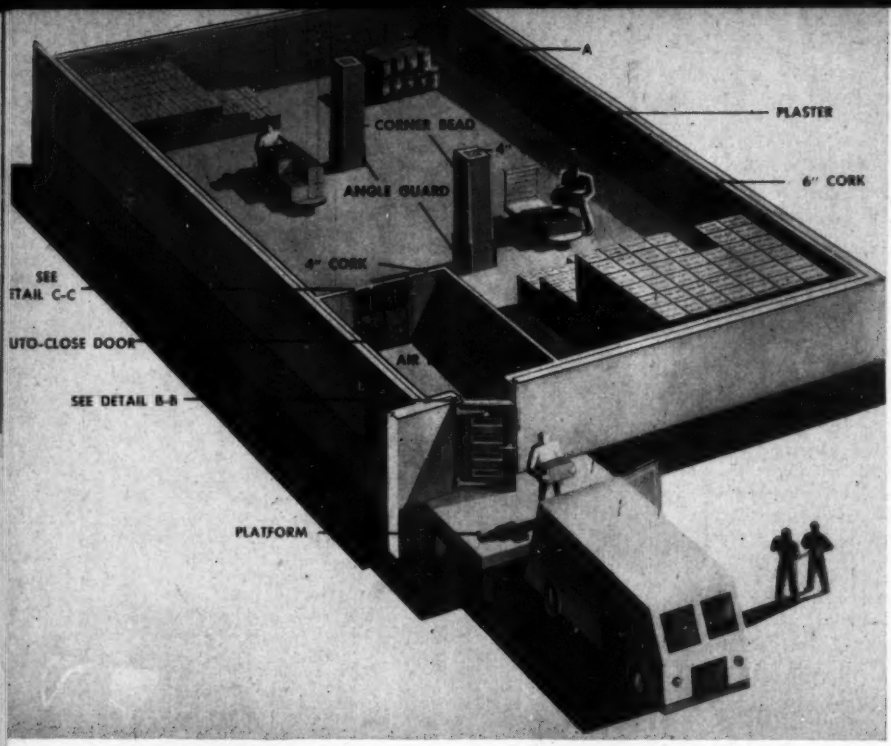
1941 Models

The 1941 sealed unit is mounted on top of the condenser but with the exception of the M-6, M-8 Kelvinator and H-6 and H-8 Leonard models, there were no notable mechanical changes. A new model thermal relay, illustrated in Figs. 12 and 13, was used on some 1941 models, while others used the same electrical system as the 1940 models.

Models M-6 and M-8 are known as the Moist-Master models, and the Leonard H-6 and H-8 are known as the Hi-Humid models. The operating cycle, illustrated in Fig. 14, shows the primary and secondary refrigerant cycles. The primary system is practically the same as the system used in conventional 1941 models, except that the refrigerant leaving the small diameter liquid line expands into a coil which surrounds the exterior of the reservoir of the secondary system. Continuing on its cycle, the refrigerant leaves this coil and enters the fast-freeze shelf of the freezing unit, from where it flows to the bottom of the freezing unit. Refrigerant is distributed equally to all parts of the freezing unit by the dispersion tube method.

The vaporized refrigerant is then drawn back to the compressor through the suction line to which the liquid line is soldered in heat exchange relationship. The compara-

(Continued on page 88)



0° STORAGES

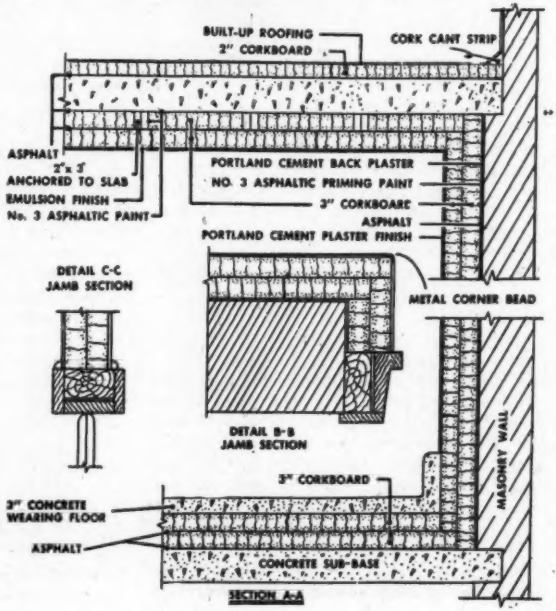
SPECIALIZED storages for frozen food are becoming important sources of income for many commercial warehouses.

As the popularity of frozen foods increases, additional refrigerated storages of this type will be necessary and in many cases existing uninsulated areas will be converted to maintain the 0° F. temperature required. The diagrams show the details of a typical construction project of this kind.

In this case 6-inch-thick corkboard was used to insulate the floor, walls, and ceiling. An additional layer of corkboard 2" thick was used on top of the ceiling slab to minimize the heat from the direct rays of the sun.

The entrance to the cold room is protected by an air lock to prevent excessive loss of refrigeration and to minimize the flow of warm, moisture laden air into the storage area.

Courtesy Armstrong Cork Co.



SHIPMENTS OF REFRIGERATION, AIR CONDITIONING EQUIPMENT

SHIPMENTS of components and accessories for air conditioning and commercial refrigeration equipment were valued at $36.9 million during the fourth quarter of 1946, according to a report released by the Bureau of the Census. The fourth quarter shipments set a new peak for the year, representing an increase of 19 per cent over the third quarter of volume of $31.1 million, and continued the steady upward trend of previous quarters.

(Continued on page 86)

TABLE I.—AIR CONDITIONING EQUIPMENT AND COMPONENTS AND ACCESSORIES FOR AIR CONDITIONING AND COMMERCIAL REFRIGERATION EQUIPMENT: SUMMARY OF SHIPMENTS BY MAJOR CLASS OF PRODUCT, THIRD AND FOURTH QUARTERS 1946

Product	Fourth Quarter 1946 Shipments of Complete Units						Third Quarter 1946 Shipments of Complete Units					
	Total		Domestic[1]		Export[2]		Total		Domestic[1]		Export[2]	
	Number	Value (dollars)	Number	Value (dollars)	Number	Value (dollars)	Number	Value (dollars)	Number	Value (dollars)	Number	Value (dollars)
SECTION I—COMPONENTS AND ACCESSORIES												
TOTAL	....	36,870,171	....	34,897,759	....	1,972,412	....	*31,106,294	....	*29,489,970	....	1,616,324
Condensing units	269,136	19,062,983	258,835	17,826,520	10,301	1,236,463	183,354	14,379,003	176,231	13,453,306	7,123	925,697
Ammonia refrigerants	317	393,636	292	356,916	25	36,720	260	255,584	231	230,246	29	25,338
Refrigerants except ammonia	268,819	18,669,347	258,543	17,469,604	10,276	1,199,743	183,094	14,123,419	176,000	13,223,060	7,094	900,359
Air cooled	253,896	13,448,971	244,575	12,586,624	9,321	862,347	172,855	10,742,050	166,664	10,121,535	6,191	620,515
Water cooled	14,923	5,220,376	13,968	4,882,980	955	337,396	10,239	3,381,369	9,336	3,101,525	903	279,844
Compressors and compressor units	81,117	4,678,259	78,475	4,436,439	2,642	241,820	32,207	*3,897,536	30,401	*3,628,611	1,806	268,925
Ammonia refrigerants	625	1,371,101	561	1,236,061	64	135,040	857	1,637,586	756	1,477,182	101	160,404
Refrigerants except ammonia	80,492	3,307,158	77,914	3,200,378	2,578	106,780	31,350	*2,259,950	29,645	*2,151,429	1,705	108,521
Centrifugal refrigeration machines	78	1,724,066	75	1,671,406	3	52,660	89	1,927,319	84	1,851,891	5	75,428
Heat exchanger equipment	....	11,404,863	....	10,963,394	....	441,469	....	10,902,436	....	10,556,162	....	346,274
Evaporative condensers	1,453	1,391,866	1,379	1,317,962	74	73,904	1,174	1,301,117	1,106	1,228,387	68	72,730
Unit coolers	55,084	5,506,059	53,405	5,274,081	1,679	231,978	47,579	4,670,426	46,566	4,546,427	1,013	123,999
Air conditioning	4,660	1,215,739	4,580	1,158,953	80	56,786	1,963	1,022,304	1,908	1,003,125	55	19,179
Refrigeration	50,424	4,290,320	48,825	4,115,128	1,599	175,192	45,616	3,648,122	44,658	3,543,302	958	104,820
Other heat exchanger equipment[3]	....	4,506,938	....	4,371,351	....	135,587	....	4,930,893	....	4,781,348	....	149,545
SECTION II—SELF-CONTAINED AIR CONDITIONING UNITS AND ABSORPTION SYSTEMS												
Self-contained air conditioning units	14,365	6,390,796	12,991	5,915,682	1,374	475,114	15,803	5,413,485	14,567	5,123,016	1,236	290,469
Store type	4,855	4,271,181	4,736	4,162,254	119	108,927	4,237	3,289,681	4,116	3,170,471	121	99,210
Room type	9,510	2,119,615	8,255	1,753,428	1,255	366,187	11,566	2,143,804	10,451	1,952,545	1,115	191,259
Miscellaneous air conditioning and refrigeration equipment, including absorption systems	....	2,640,287	....	2,571,043	....	99,244	...	1,290,766	..	1,263,831	....	26,935

*Revised.
[1]Continental United States.
[2]Includes Canada, Mexico, and United States territories.
[3]Includes condensers and liquid coolers, shell and tube and shell and coil types, as well as fin coils (heating and cooling) and plate type evaporators.

TABLE II.—AIR CONDITIONING EQUIPMENT AND COMPONENTS AND ACCESSORIES FOR AIR CONDITIONING AND COMMERCIAL REFRIGERATION EQUIPMENT: PURCHASES FOR INCORPORATION INTO COMPLETE UNITS OR FOR RESALE, THIRD AND FOURTH QUARTERS 1946

Product	Fourth Quarter 1946 Purchases of Complete Units and Components				Third Quarter 1946 Purchases of Complete Units and Components			
	Complete Units (number)	Compressors or Compressor Units (number)	Condensers (number)	Total Purchase Value (dollars)	Complete Units (number)	Compressors or Compressor Units (number)	Condensers (number)	Total Purchase Value (dollars)
SECTION I—COMPONENTS AND ACCESSORIES								
TOTAL	....	....	....	1,323,807	...	....	....	776,748
Condensing units	3,453	6,646	6,223	751,194	4,194	6,427	6,332	617,839
Ammonia refrigerants	0	0	0	0	22	0	0	21,248
Refrigerants except ammonia	3,453	6,646	6,223	751,194	4,172	6,427	6,332	596,591
Air cooled	2,397	6,032	5,728	376,501	3,519	5,934	5,837	394,524
Water cooled	1,056	614	495	374,693	653	493	495	202,067
Compressors and compressor units	52	....	....	7,924	227	....	....	21,255
Ammonia refrigerants	0	....	....	0	2	....	....	2,600
Refrigerants except ammonia	52	....	....	7,924	225	....	....	18,655
Centrifugal refrigeration machines	0	0	0	0	0	0	0	0
Heat exchanger equipment	....	....	....	564,689	...	....	....	137,654
Evaporative condensers	96	....	....	177,056	45	....	....	53,643
Unit coolers	243	....	....	218,156	121	....	....	68,226
Air conditioning	3	....	....	1,600	3	....	....	888
Refrigeration	240	....	...	216,556	118	....	....	67,338
Other heat exchanger equipment[1]	....	....	...	169,477	...	....	....	15,785
SECTION II—SELF-CONTAINED AIR CONDITIONING UNITS AND ABSORPTION SYSTEMS								
Self-contained air conditioning units	30	1,100	0	59,453	*205	1,090	1,163	*105,781
Store type	30	60	0	20,141	*205	50	0	*52,339
Room type	0	1,040	0	39,312	0	1,040	1,163	53,442
Miscellaneous air conditioning and refrigeration systems, including absorption systems	....	....	...	...	....	....	....	....

*Revised.
[1]Includes condensers and liquid coolers of shell and tube and shell and coil types, as well as fin coils (heating and cooling) and plate type evaporators.

QUESTIONS and ANSWERS

On Problems of Servicing and Installation of Refrigerating Equipment—Send Your Problems to the Question Box.

COMMENTS ON QUESTIONS

REFERENCE TO QUESTION 787—The first thing I would look for in a case like this is a plugged screen. There are several screens used in the Norge cabinets with Rollators—one between the suction service valve and the compressor, another in the flange holding the liquid and suction lines on the header of the "boiler," and still another between the suction line connection on the suction service valve and the check valve, which usually is incorporated in the service valve. Which of these screens is plugged is fairly simple to determine. Installing the suction gage in its proper place on the Rollator, and opening the gage to the suction compressor, note the reading. Start the unit, and after operating for several minutes, again note the suction pressure. If it has not dropped very much, and the Rollator seems to be operating as if on a deep vacuum (no heat on the discharge side, or a cool body), the screen between the suction service valve and the Rollator is most likely plugged.

If, however, the suction gage pulls a very deep vacuum, even with the suction service valve open to the system, the chances are that either the screen on the boiler header, or the screen before the check valve is plugged. This may be checked by "cracking" the flare nut on the suction service valve. If there is liquid to this point, it is the screen in the service valve, before the check valve. If there is no liquid at this point, but the system starts to draw in air, then the screen on the boiler header is plugged. I find that the check valves on Rollators very seldom give trouble.—*Phil B. Montgomery, Riverside, Calif.*

REFERENCE TO QUESTION 779: In regards to the Universal compressor, I have had several more service calls on this refrigerator. On the next call I decided there must be something binding in the compressor so dismantled same. I found the inside of the compressor copper-plated and the connecting rod sprung causing the piston to bind at one spot in the downward stroke. I drew the conclusion that the reason the motor stalled only at times, was when the pump happened to stop at the binding point.

I replaced this compressor with a factory rebuilt and installed a drier. As I understand copper-plating is caused by reaction between methyl, moisture and oil. One week later I had another call saying the compressor ran all right but had poor cooling. At this time I found the discharge valve plated and not seating. After polishing valve and installing a second drier I had the box running like new, but know it will only last until the valve is plated again.

My whole trouble with this job is copper-plating and I would like to know what is really causing it and how to remedy it.

Has anyone an easy way to replace a door gasket on a P-6-35 Frigidaire? This gasket is held by the frame of the door and the door frame is put together with pitch. Only screws being the ones to the door handle. I do not like to attempt to reglue this door, especially in the customer's home.

REFERENCE TO QUESTION 790: The questioner says "I arrive at 3.7 tons which I am told is high." The answer, 2.3 tons refrigeration agrees with my method except that I would add 15% to the U values given in Table XXXI to account for lapped joints, broken corners, irregularities, etc. I get the following results:

	BTU/24 hrs.
Milk Storage Room 4128 (90-36)	
$.061 \times 1.15 \times 24$	= 376,000
Add 20%	75,200
Milk Cooling $30,000 \times .9(46\text{-}36)$	= 270,000
	721,200

Tons capacity = 2.5

If the writer of the question cares to send me his figures for obtaining his answer 3.7 tons, I would be happy to check them and point out any discrepancies. The answer 2.5 tons is for continuous operation. If the compressor operated automatically two-thirds of the time it would require a compressor of 3.75 tons.

I would solve the hardening room problem as follows, assuming that about 50% of the latent heat had been removed in the freezer.

	Btu/24 hrs.
Insulation losses:	
1588 × [90 — (—30)] × .032 × 1.15 × 24 × 1.2	= 201,600
Ice cream load:	
Latent heat, .50 × 480 × 5.2 × 96 × 1.2	= 143,600
Cooling to —10F, 480 × 5.2 [24— (—10)] .4 × 1.2	= 40,800
	386,000

Tons capacity=1.34

The short method of computing the hardening room load as per A.S.R.E. Data Book would give the following answer for 480 gal. of ice cream:

	Btu/24 hrs.
Insulation losses without the 20% 1588 [90— (—30)] × .032 × 1.15	= 168,000
480 gal. @ 590 Btu.	= 283,000
	451,000

Tons capacity=1.56

Note: In the answer to this part of the problem in the May issue the figure 450 gal. was used instead of 480.—*H. G. Venemann, Professor of Refrigeration, Purdue University, Indiana.*

MAYFLOWER UNIT

QUESTION 791: I was called to service a Mayflower hermetic unit charged with "Freon." The condenser has a can-like contraption that was filled with some liquid but is now rusted throughout. Can you tell me what it is for? Should the unit operate normally without it? The trouble now is that the compressor runs continuously but the evaporator frosts only where the capillary tube enters. Would you advise putting in more "Freon" or a new condenser and capillary tube?

ANSWER: Your description of the Mayflower unit leads me to believe that you have what was originally known as the Gale Equalizer unit, which was originally made by Gale Products Company, Galesburg, Illinois, and later used by Mayflower Products Company. This Gale Equalizer unit is a Tecumseh unit with a special condenser arrangement known as the fluid-cooled static condenser.

The fluid-cooled static condenser is virtually a water cooled condenser, but instead of taking on fresh water and discharging it after it has been warmed by the heat of the condensed gas, the condenser stores the hot water (which has chemicals added to prevent freezing and corrosion) in a reservoir during the running cycle, cooling it during the off cycle, ready to be re-used.

However, the fluid is partially cooled before reaching the reservoir, because as it passes through the fin tube surrounding the refrigerant tube, it gives up what heat it can to the air. The remainder of the heat is retained in the fluid, which circulates into the reservoir. When the compressor shuts off and heat is no longer being given up by the refrigerant tube, the fluid circulates back out into the fin tubes and cooling is continued until the initial temperature is reached.

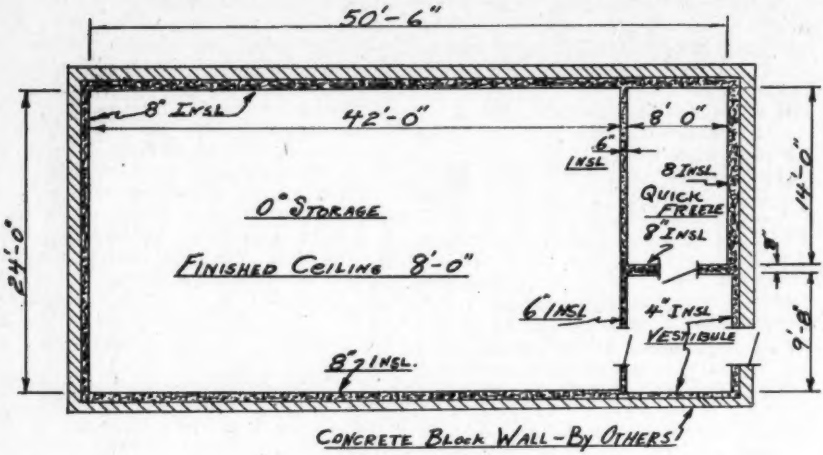
The refrigerant tube passes through the fluid tube, which carries the heat dissipating fins, and the fluid tube is connected to the reservoir in such a way as to take advantage of the principle of thermo-syphoning, to give it the required circulation. As the heat is being given off by the refrigerant tube, it is picked up by the fluid surrounding it, which in turn dissipates by means of the fins that amount of it which the air can carry off without necessitating higher head pressures in order to obtain a higher condenser temperature. The rest then circulates into the reservoir, because as the fluid surrounding the tube is heated, it flows from the tube into the top of the reservoir, forcing the cool fluid out the bottom into the tube. Then after the compressor shuts off, the hot fluid in the tube cools down, and the circulation is reversed; it now flows out of the tube into the bottom of the reservoir, forcing the hot fluid out of the top.

If the liquid has leaked out of this can it will be necessary to repair or replace the can and refill it. I have no information on what the liquid is, but you may order it from Gale Products Co. in Galesburg, Ill.

Continuous running of the unit could be caused by the lack of this fluid, since the head pressures would run up considerably higher than normal and possibly keep the unit running excessively. On the other hand, if there is sufficient liquid still remaining in the reservoir to properly cool the condenser, the continuous running could be due to a shortage of refrigerant.

TURKEY STORAGE ROOM

QUESTION 792: I am submitting specifications for a turkey storage room which we propose to furnish refrigeration equipment



for. This room includes an 8 x 14 x 8 quick freezer to be kept at a temperature of —30 degrees, and a vestibule 8 x 9'8" x 8 to be kept at a temperature of what you suggest to keep the doors from sticking from the quick freezer (temperature of —30) and the 42 x 24 x 8 storage room that is to be kept at 0 degrees. It is estimated that approximately 3500 turkeys will be kept in the storage room and approximately 200 at a time in the quick freezer. They will be pre-chilled at approximately 35 degrees before going to the quick freezer room.

Please furnish us with information as to what type coils should be used in the quick freezer, vestibule and storage room. Also the size of compressor to be used with a 60 cycle, 220 Volt AC available.

ANSWER:

Outside design temperature..... 95° F.
Turkey average weight..... 20 lbs.
Specific heat before freezing..... .80
Specific heat after freezing..... .38
Latent heat of freezing..... 93 Btu.

Calculations per bird of 20 lbs.

Chilling in cooler:
20 lbs. $\times$ (98-35) $\times$ .8 ..... = 1008 Btu.
Freezing:
20 lbs. $\times$ 93 ..... = 1860 Btu.
20 lbs. $\times$ [35 -(-30)] $\times$ .38 .. = 494

Total ..... 2354 Btu.

Leakage—storage room:
Walls 44 $\times$ 8 ..... = 352
Walls 44 $\times$ 8 ..... = 352
Walls 26 $\times$ 8 ..... = 208

Total 912

Ceiling 26 $\times$ 44 ..... = 1144
Floor 26 $\times$ 44 ..... = 1144

$$U = \frac{1}{\frac{1}{6.2} + 1.28 + \frac{8}{.28} + .13}$$

$$U = \frac{1}{.162 + 1.28 + 28.6 + .13}$$

$$U = \frac{1}{30.07} = .033$$

$K = A \times U \times td$
$= 912 \times .033 \times (95\text{-}0)$
$= 2856$ Btu. per hour for walls
$= 1144 \times .033 \times (115\text{-}0)$
$= 4350$ Btu. per hour for ceiling

Floor:

$$U = \frac{1}{\frac{45}{.21} + \frac{4}{8}} = \frac{1}{\frac{21.4 + .5}{21.9}} = \frac{1}{21.9} = .045$$

$K = 1144 \times .045 \times 50 =$
$= 2580$ Btu. per hour for floor

Leakage—Freezer:
Walls 10 $\times$ 8 ..... = 80
Walls 10 $\times$ 8 ..... = 80
Walls 16 $\times$ 8 ..... = 128

288

Ceiling 10×16 ..... = 160
Floor 10×16 ..... = 160
U = .033 Walls and Ceiling
U = .045 Floor

$H = 288 \times .033 \times 115$
$= 1092$ (3 walls)
$H = 128 \times .044 \times 20 = 125$ (one wall)
$H = 160 \times .033 \times 135$
$= 710$ Ceiling
$H = 160 \times .045 \times 70$
$= 370$ Floor

Total Freezer Load

Leakage	1092
	125
	710
	370
Product	
$\frac{1860 \times 200}{18}$	20600
Freezing	22897 Btu. per hour

Coil capacity should be 23,000 Btu. per hour at —40 F. temperature with 10 F. temperature difference between coil and freezer. Blower type coils are manufactured for this application by Bush Mfg. Co., McQuay, Inc., and McCord Corp. Plate coils for the job are made by Dole Mfg. Co., Kold-Hold Mfg. Co., and Stangard-Dickerson Co.

Unit and Coil Capacity

The unit required for the freezer must be capable of handling 23,000 Btu. per hour at —40 F. refrigerant temperature. This is an average 10 hp. machine using "Freon-12."

Storage Load:

Leakage	2856
	4350
	2580
	9786
15% safety	1470
Total	11256 Btu. per hour

Coil capacity should be 12,000 Btu. per hour at —10 F. temperature with a 10 F. temperature difference between coil and storage room. Blower type or plate type coils can be used.

No product load need be considered as the product comes out of the freezer at —30 F. and into storage at 0 F.

An average 2 hp. unit designed for "Freon-12" will carry the load at —15 F. refrigerant temperature.

All the above figures do not consider the equipment necessary for chilling to 35 F.

Cooling below freezing is not included in the total capacity of the freezer since this load will occur after freezing and ample capacity will be present to do the job.

No Cooling in Vestibule

Do not put coils in the vestibule. The outside door should be a freezer door preferably a vestibule type such as is manufactured by Jamison Cold Storage Door Co. or C. V. Hill Co. The freezer door should be full 8" thick and called a freezer door. Door into the storage should be heavy duty lap sealing to avoid freezing shut.

REFRIGERATED SAFES

WHEN is a bank vault like a medicine cabinet?

The Rupp and Bowman Co. has the answer—this Toledo, Ohio, drug firm for the last year has been storing sulfa drugs, penicillin, biologicals and many pharmaceuticals in what were bank vaults.

The vaults now are refrigerators. Originally they were built by the now defunct Security Savings Bank and Trust Co. in the structure at 315-317 Madison Ave. Later, when Security moved into the building at Huron St. and Madison Ave., the Spitzer-Rorick Trust and Savings Bank moved in, then several years ago moved out.

Waldo M. Bowman, head of the drug company, was told it would cost more than the vaults were worth to remove them. Then he found that with proper insulation the storage vaults would make refrigerators for great quantities of penicillin, sulfa derivatives and biologicals.

Today Rupp and Bowman keep under a constant temperature of 40 degrees a supply of Lederle Laboratory products for distribution to hospitals and drug stores in northern Ohio, all but three northern counties in Michigan and northwestern Indiana.

The 51-year-old firm probably is the only one this side of the Pacific coast stocking such a combination as medical, surgical and scientific supplies, Mr. Bowman believes.

Narcotics are kept in a sizeable steel safe, guarded by burglar alarms.

An estimated million prescriptions, dating back to 1914, are on file. Files previous to 1914 were burned in a fire which destroyed most of the store.

SERVICE POINTERS

A department for the exchange of ideas on new devices and methods of improving service work. Five dollars is paid for each pointer published. Write up your idea today and mail it to the Service Pointer Editor.

CORRECTION

UNDER the heading "Hermetic Motor Color Chart" appearing on page 47 of the April, 1947 issue, we listed the color schemes for the starting, running and common terminals of all the principal hermetic units.

We were in error on the colors shown for Norge unit. Red is starting, black is running and white is common on the Norge, therefore Norge should have appeared in the same group as Frigidaire, Westinghouse and Servel in the chart. Please note this correction in your April issue.

BUBBLE SOLUTION

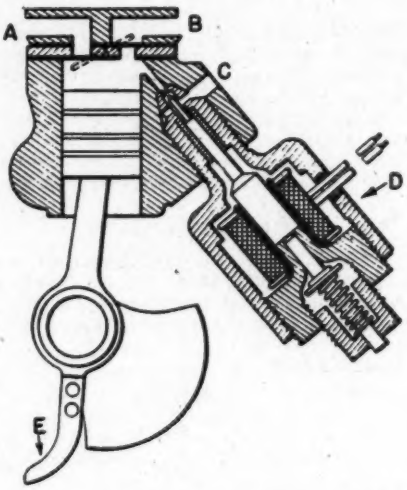
CHILDRENS bubble solution as sold in dime stores and novelty shops, make a ready mixed and very fine soap solution for checking leaks. It comes in handy size bottles convenient to carry in the service kit, it bubbles well and will hold a bubble so that the leak is easily detected.—*Submitted by C. G. Bills, Alhambra, Calif.*

WESTINGHOUSE UNITS

QUITE a large number of the Westinghouse sealed units are equipped with a high side float and an unloader valve for easy starting. (The latter is, of course, necessary when the high side float is used). The unloader is in the form of a small solenoid valve connected in series with the motor windings and opening or closing a small port in the top of the cylinder.

One of the major causes of failure in Westinghouse units is due to these unloader valves. They may stick open or closed or the leads or windings of the coil may become grounded or open.

If the unloader sticks in the closed position, the unit will not start because of the high head pressure and the consequent additional starting load on the motor. However, you are in luck because this is the easiest of the three conditions to correct Simply remove the high side float and install a capillary tube in its place, made up of about 7 ft. of .032" I.D.—.095" O.D. tubing for the SO_2 units, or 6 ft. of the same size tubing for the F-12 units. The capillary tube provides equalizing of pressure during the "off" period and the unloader is not needed.



If the unloader sticks in the open position, the unit will run but not pump. It will probably be necessary to cut the unit open because it is seldom the unloader can be jarred loose. While the unit is open, and to avoid future trouble, take the unloader coil out of the circuit and either remove the unloder entirely or fasten the needle in a closed position so the unloader port will be permanently closed. Replace the high side float with a capillary tube.

Because the unloader valve coil is in series with the motor winding, it is impossible to determine from outside tests whether shorts,

grounds or open circuits are in the motor windings or in the unloader coil, but chances are they are in the unloader coil. In either case the unit will have to be opened. A change to a capillary is again suggested at this time.

ELECTRICAL TEST DEVICE

A HANDY test device to have on the motor test bench is a receptacle with a 600 to 1000 watt heating element connected in one side of the line as a resistor. This will save a lot of burned out fuses and time when checking motors for first time after overhaul, adjusting starter contacts, the throw out action of repulsion induction motors, reversing rotation, etc.

A 1000 watt lamp is impressive as it first lights up then gradually goes dim as the motor comes up to speed, but would be more expensive than the junk heating element most of us have laying around unused. This arrangement will start up to ½ hp. motors idle.

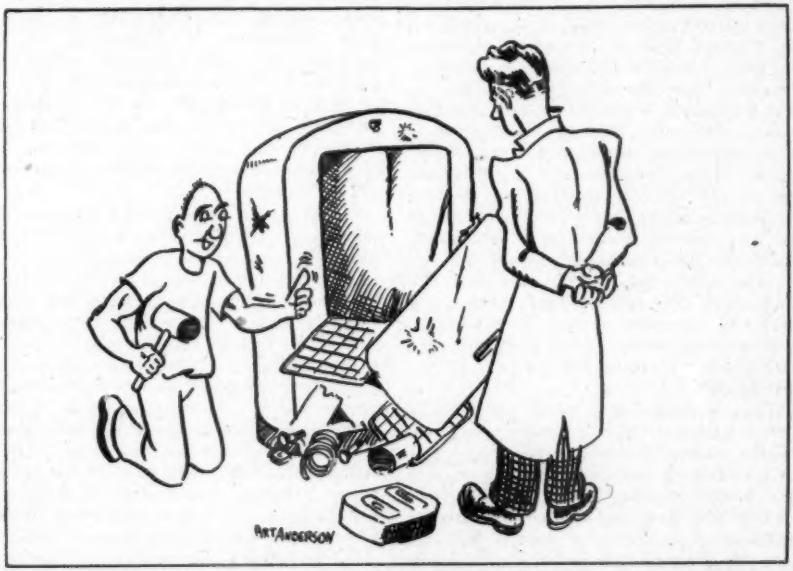
Be sure to place resistor element clear of combustible material, as it will become red hot in a short time on a shorted or locked motor.—*Submitted by Glenn Fee, Knoxville, Iowa.*

REPAIRING LADDERS

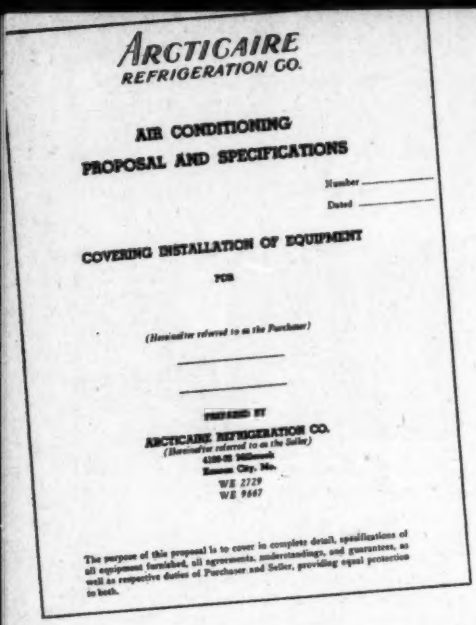
A "GLUE GUN"—a converted grease gun—is a pretty handy gadget for repairing your ladders when the rungs have become loose. It can be used on furniture, too, with equal ease. Drill a 1/16" hole in the side rail of the ladder at the end of the rung and with the gun, force heavy water-proof glue in the hole until the space around the end of the rung is filled. This eliminates the need of taking the ladder apart for repairs, saving hours of labor. It does a better job, too.

Keeping ladders in good repair is a "must" on any safety program and here is a help in doing it.

Convert the grease gun by removing the alemite connector and installing a tapered nozzle with a 1/16" hole in the end.



"WHEN IT COMES TO TAKING OUT A KNOCK, BOSS, I USED TO BE THE BEST AUTOMOTIVE MAN IN THE BUSINESS!"



ARCTICAIRE
REFRIGERATION CO.

AIR CONDITIONING
PROPOSAL AND SPECIFICATIONS

Number _____
Dated _____

COVERING INSTALLATION OF EQUIPMENT

FOR

(Hereinafter referred to as the Purchaser)

PREPARED BY

ARCTICAIRE REFRIGERATION CO.
(Hereinafter referred to as the Seller)
4128-30 Millcreek
Kansas City, Mo.
WE 2729
WE 9667

The purpose of this proposal is to cover in complete detail, specifications of all equipment furnished, all agreements, understandings, and guarantees, as well as respective duties of Purchaser and Seller, providing equal protection to both.

Presentation Folder Helps Refrigeration Dealer Win Contracts

By HERBERT HANLEY

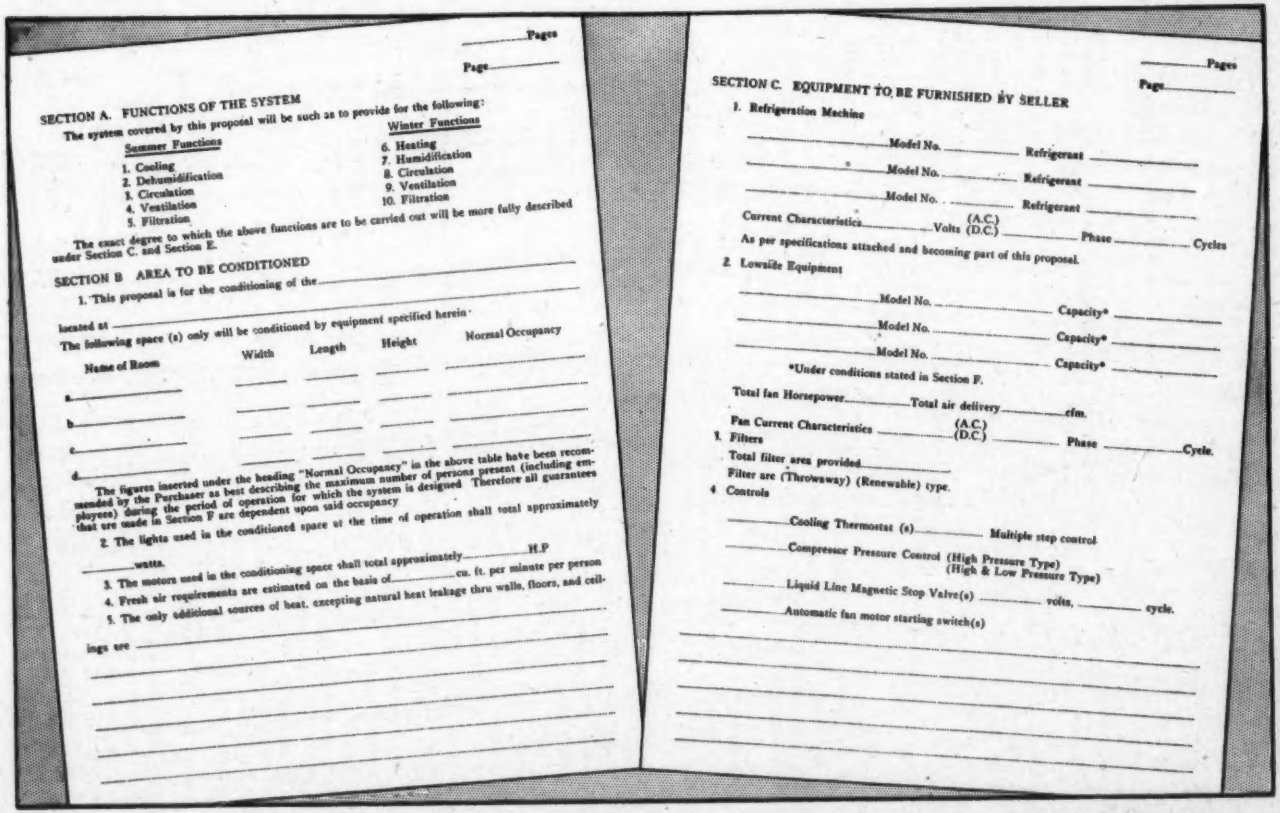
MANY profitable refrigeration and air conditioning contracts have been won or lost according to the method in which the dealer presented his proposal, according to Ted Rostock, head of Articaire Refrigeration Company, 4128 Millcreek, Kansas City, Missouri. "We have found that making a good impression in presenting our specifications for the job is just as important as a handsome display room, and a nationally accepted line of equipment," Mr. Rostock pointed out. "If the refrigeration or air-conditioning dealer simply submits details of the proposed installation on a letterhead, with hasty sketches, finger-smudged typing, etc., the chances are that the purchaser will think that the refrigeration contractor's work will be equally sloppy. Therefore, we place a great deal of stress on the manner with which we present each proposal to our customers."

Doing a volume of $186,000 per year in 1946, Articaire Refrigeration Company handles a complete line of refrigeration and air conditioning equipment, all the way from dry bottle beverage coolers to multiple package and central-system air conditioning installations. Engineering most of his own jobs, Mr. Rostock has developed a beautiful proposal and specifications folder which covers even the most microscopic element of the eventual installation, and leaves nothing to chance. When a potential sale exists, Mr. Rostock, or one of four salesmen, goes over the site with the proverbial fine-tooth comb, studies every phase of the job which may require custom work, and incorporates every tiny detail in the presentation form.

This, bound into a heavy embossed blue cover, consists of five bond paper sheets, beautifully printed, and flexible in that alternate sheets may be substituted to cover either an air conditioning or refrigeration job. The first page is headed "Articaire Refrigeration Company—Air conditioning proposal and specifications." Underneath is the proposal number and the date, and the headline "Covering installation of equipment for————.", and the signature "Prepared by Articaire Refrigeration Company, hereinafter referred to as the Seller." At the bottom of the page a paragraph reads, "The purpose of this proposal is to cover in complete detail specifications of all equipment furnished, all agreements, understandings, and guarantees, as well as respective duties of purchaser and seller, providing equal protection to both."

On the second page, headed "Function of the System" is an exact description of what the installation is to do. Proposal indicates summer functions, such as cooling, dehumidification, circulation, ventilation and filtration, and winter functions for heating circulation, etc. Beneath this, the areas to be air conditioned are outlined, with alphabetized spaces for the name of each room, the width, length, height, and normal occupancy of the room. In the section beneath, Articaire incorporates the heat load of electric lights in the space, sets forth the electrical horsepower required to overcome it, fresh air requirements, and lists all additional sources of heat which must be contended with.

On the third page, in four sections, are listed "Equipment to be Furnished by Seller." First is the refrigeration machine,



_____Pages

Page_____

SECTION A. FUNCTIONS OF THE SYSTEM

The system covered by this proposal will be such as to provide for the following:

Summer Functions

1. Cooling
2. Dehumidification
3. Circulation
4. Ventilation
5. Filtration

Winter Functions

6. Heating
7. Humidification
8. Circulation
9. Ventilation
10. Filtration

The exact degree to which the above functions are to be carried out will be more fully described under Section C. and Section E.

SECTION B AREA TO BE CONDITIONED

1. This proposal is for the conditioning of the _____

located at _____

The following space (s) only will be conditioned by equipment specified herein.

Name of Room	Width	Length	Height	Normal Occupancy
a.				
b.				
c.				
d.				

The figures inserted under the heading "Normal Occupancy" in the above table have been recommended by the Purchaser as best describing the maximum number of persons present (including employees) during the period of operation for which the system is designed. Therefore all guarantees that are made in Section F are dependent upon said occupancy.

2. The lights used in the conditioned space at the time of operation shall total approximately _____watts.

3. The motors used in the conditioning space shall total approximately_____H.P

4. Fresh air requirements are estimated on the basis of_____cu. ft. per minute per person

5. The only additional sources of heat, excepting natural heat leakage thru walls, floors, and ceilings are _____

_____Pages

Page_____

SECTION C. EQUIPMENT TO BE FURNISHED BY SELLER

1. Refrigeration Machine

_____Model No._____ Refrigerant _____

_____Model No._____ Refrigerant _____

_____Model No._____ Refrigerant _____

Current Characteristics_____(A.C.) Volts (D.C.)_____ Phase_____ Cycles

As per specifications attached and becoming part of this proposal.

2. Low side Equipment

_____Model No._____ Capacity* _____

_____Model No._____ Capacity* _____

_____Model No._____ Capacity* _____

*Under conditions stated in Section F.

Total fan Horsepower_____Total air delivery_____cfm.

Fan Current Characteristics _____(A.C.) (D.C.)_____ Phase _____Cycle.

3. Filters

Total filter area provided_____

Filter are (Throwaway) (Renewable) type.

4. Controls

_____Cooling Thermostat (s)_____ Multiple step control

_____Compressor Pressure Control (High Pressure Type) (High & Low Pressure Type)

_____Liquid Line Magnetic Stop Valve(s) _____ volts, _____ cycle.

_____Automatic fan motor starting switch(s)

_____Pages

Page_____

SECTION D DESCRIPTION OF SYSTEM AND METHOD OF OPERATION

_____

_____

_____

_____

_____

SECTION E. DIVISION OF WORK

1. _____will deliver and locate all of equipment described in Section C.

2. _____will erect all of the cooling, heating, and humidifying equipment except as limited by other provisions in this section. If erected by Seller all work will be done during regular working hours.

3. _____will furnish necessary oil and refrigerant for the initial charge of the system.

4. _____will furnish the necessary fittings, pipe and labor to connect drain to carry away the condensation from the cooling coil.

5. _____will furnish the necessary fittings, pipe and labor to connect the water supply and drain to the humidifier.

6. _____assumes responsibility that the main water supply to the building as well as the purchaser's meter are of sufficient size to provide water for refrigerating machine condensers and/or cooling coils.

7. _____will furnish the necessary fittings, pipe and labor to connect the proper size of water supply and drain lines to the refrigerating machine.

8. _____will supply sufficient_____ covering for suction lines to prevent sweating

9. _____will provide all necessary duct work, grilles and registers, as per drawings attached. All such drawings shall be initialed by Purchaser upon his acceptance of this proposal and become a part of the contract.

10. _____will provide for all cutting, plastering, patching and redecorating resulting directly from the installation of equipment offered in the proposal.

11. _____will provide a_____ ampere fused disconnect switch within_____ of

_____Pages

Page_____

the refrigerating machine and _____ will provide all conduits, wiring, fittings and labor necessary for completing connections to compressor motor(s), fan motor(s), and the entire control circuit.

12. _____will furnish necessary electrical, building, and plumbing permits for installation of equipment.

13. _____will furnish foundations for the refrigerating machine.

14. _____will supply necessary hangers and supports for suspended type units.

15. _____will pay any sales tax called for by this contract.

SECTION F GUARANTEES

1. Cooling Season Guarantee

The Seller guarantees the herein described machinery and apparatus when installed and operated in accordance with instructions of the Seller to be capable of producing a maximum average dry bulb temperature of _____°F. at which time the relative humidity will not exceed_____%, when the outside dry bulb is_____ _°F., and the outside wet bulb is_____°F. and the total heat introduced into or generated within the conditioned space is as specified in Section A.

The above guarantee is made with the understanding that the building will be made reasonably tight to prevent excessive infiltration and air leakage, and all openings in the conditioned space will be kept closed except for normal entrance and exit of occupants; and further that the amount of outside air introduced into the system thru the conditioner shall not exceed_____cu. ft. per minute.

Price and terms of payment are outlined in attached contract forms which becomes part of this proposal.

Accepted by

_____

Purchaser's Name

Date _____

with a model number and type of refrigeration being used, electrical current characteristics in volts, phases and cycles. Next is lowside equipment with a model number, and capacity, total fan horsepower, total air delivery in cubic feet per minute, fan current characteristics, such as AC or DC, and the phase. The total filter area is listed, type of filters, and lastly, controls, such as cooling thermostats, multiple step controls, compressor pressure controls, liquid line magnetic stop valve, and automatic fan motor starting switch. Every component of the eventual system is thus listed.

On the succeeding page is a 6 line blank section titled "Description of System and Method of Operation." Great care is used in writing up the advantages of the refrigeration or air conditioning equipment, stating precisely what it will do for the purchaser. Beneath this is "Division of Work." Carefully identified is the matter of whether the purchaser or seller will deliver and locate the equipment, erect all equipment, furnish refrigerant, pipes, labor, water supply, etc. The extra expense which has often been incurred by dealers in installing equipment which was found to require additional carpentry, plumbing lines, etc., not specified in the contract, is thus "eliminated in advance."

On the last page, Articaire Refrigeration Company identifies who will furnish necessary electrical building and plumbing permits, foundations for the refrigerating machine, hangers and supports for suspended-type units, and sales tax. The last section—and one of the most important—lists all guarantees for equipment performance, temperatures to be maintained at different relative humidity readings, etc. Close attention to details in this way has helped the company to win many outstanding contracts for both air conditioning and refrigeration.

S S S

NEW WATER DETECTOR USES INFRA RED SPECTROMETER

A NEW technique for measuring the amount of water in "Freon" fluorine refrigerants and certain other organic gases and liquids with an accuracy of one part in a million was described to the American Chemical Society in a paper by A. F. Benning, A. A. Ebert and C. F. Irwin of the Organic Chemicals Department of E. I. du Pont de Nemours & Co. They told of research which was carried out at the request of Kinetic Chemicals, Inc., a Du Pont affiliate, to further improve the purity of the "Freon" fluorinated hydrocarbons, widely used as the cooling medium in mechanical refrigerators.

"In the case of refrigerants, the water content is of special importance," Mr. Ebert said in presenting the paper. "This is because moisture in a refrigerating system may result in freezing at the expansion valves, in the corrosion of metal parts, and in the formation of objectionable sludge, and so lead to faulty mechanical operation.

"To keep these undesirable effects at a minimum, it is desirable to keep the water concentration below 10 parts per million. This is to enable manufacturers to make refrigerators that can go ten years without servicing."

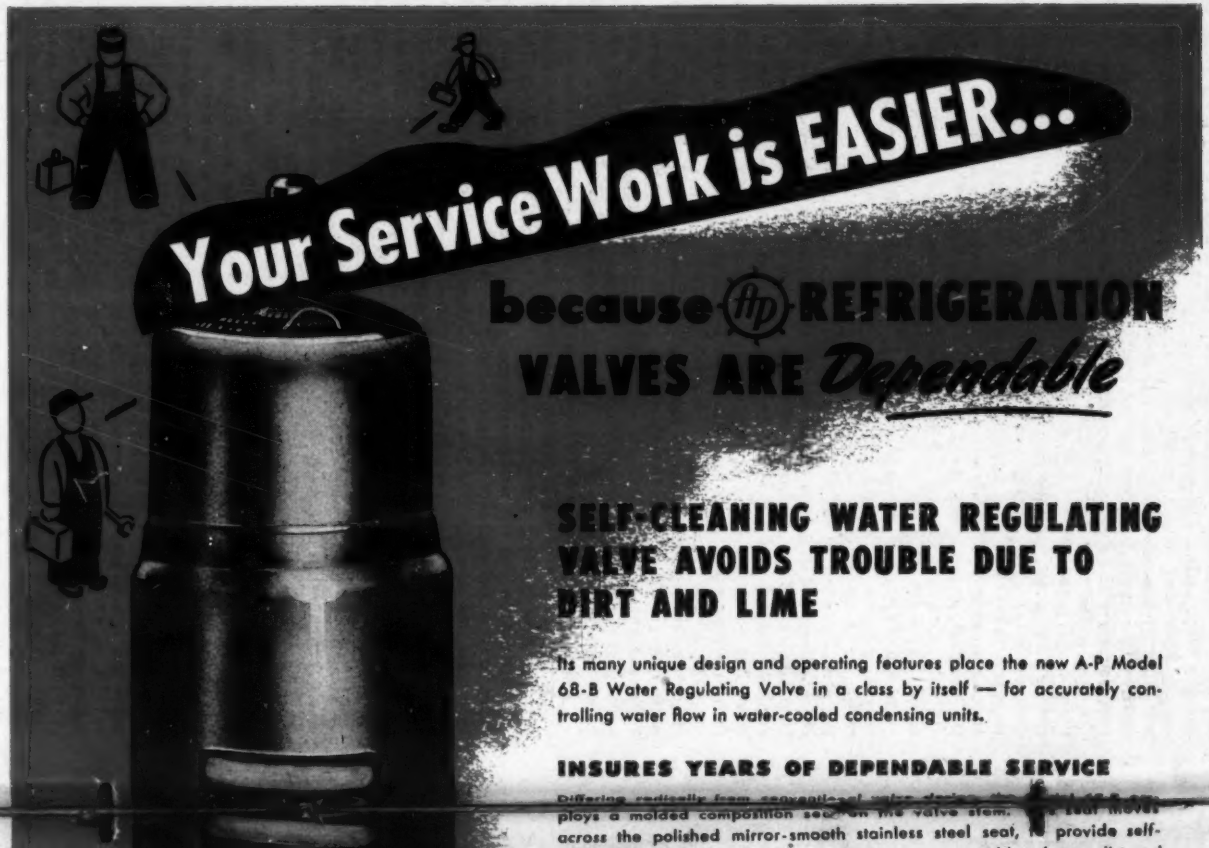
The technique described by Mr. Ebert, which makes use of the infra-red spectrometer, is capable of determining the water in "Freon" and certain other fluids with an accuracy of one part per million, and an analysis can be made in five minutes.

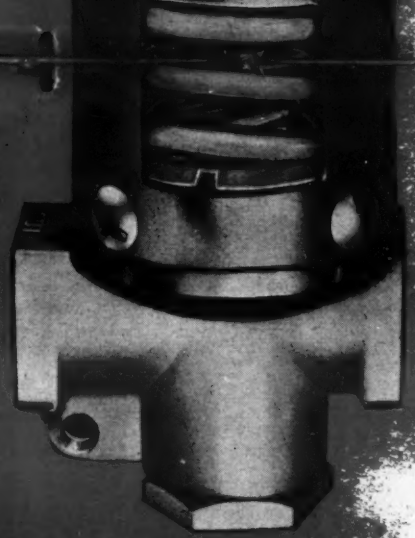
The infra-red technique is quite simple in theory, Mr. Ebert related. Invisible light, with a wavelength of 2.67 microns, or about one ten-thousandth of an inch, is passed through a transparent cell filled with the sample to be tested. The "Freon" absorbs very little of the radiation at this particular wavelength, but water strongly absorbs this type of invisible light. Thus, by means of a device which measures and automatically records the intensity of the infra-red light before and after it has passed through the test cell, the amount of water present may be read directly from a calibrated scale.

Through the use of this analytical tool, Mr. Ebert pointed out, the purity of fluorine refrigerants is being controlled to a degree not previously possible. Refrigerants of this type are now available, he said, with a water content "not in excess of ten parts per million." They are usually delivered at from four to five parts per million, corresponding to about one teaspoonful of water per ton of refrigerant. In reference to water content this means a purity of 99.999 per cent or better.

S S S

IT IS estimated that 12 million refrigerators will be replaced by 1950. Of these, 4 million may be reconditioned and resold; one million kept by owners as second refrigerators; 500,000 remain as an inventory of used refrigerators and 6.5 million junked by owners or dealers.


Your Service Work is EASIER...
because A-P REFRIGERATION VALVES ARE Dependable
SELF-CLEANING WATER REGULATING VALVE AVOIDS TROUBLE DUE TO DIRT AND LIME
Its many unique design and operating features place the new A-P Model 68-B Water Regulating Valve in a class by itself — for accurately controlling water flow in water-cooled condensing units.
INSURES YEARS OF DEPENDABLE SERVICE
ploys a molded composition
across the polished mirror-smooth stainless steel seat,
provide self-



AUTOMATIC PRODUCTS COMPANY

2484 NORTH THIRTY SECOND STREET • MILWAUKEE 10, WISCONSIN
EXPORT DEPT. 13 E. 40TH STREET, NEW YORK 16, N. Y.

INSURES YEARS OF DEPENDABLE SERVICE

Differing radically from conventional valve designs, the Model 68-B employs a molded composition seat on the valve stem. The seat moves across the polished mirror-smooth stainless steel seat, to provide *self-cleaning* "wiping" action, thus avoiding common troubles due to dirt and lime in the water.

The Model 68-B has been laboratory tested in *sandy water* — the equivalent of many years of actual field use — and neither the sliding seal nor the seat show any sign of wear — indicating "lifetime" efficiency.

Put the Model 68-B on either new or present installations to improve operation and insure years of Dependable service. Ask your jobber about it, or write for Bulletin No. M100.

FEATURES OF A-P MODEL 68-B PRESSURE ACTUATED WATER REGULATING VALVE

Long Stroke gives closer, more uniform control.
Self-Cleaning action avoids troubles due to dirt or lime in water.
Wartime-proved packless "O" Ring valve stem seal
Chattering, water-hammer positively eliminated.
Drain plug permits valve flushing.
Flow not affected by compressor pulsations.
Head pressure range 50 p.s.i. to 150 p.s.i.
Adjusting nut easily accessible.
Used on Freon, Methyl Chloride, or Sulphur Dioxide systems.
Three sizes — ⅜", ½", ¾" inlet and outlet.

DEPENDABLE *Refrigerant Valves*

Stocked and Sold by Good Refrigeration Jobbers Everywhere . . . Recommended and Installed by Leading

Preventive Measures for Failure of Piping in Ice Skating Rinks.

By PAUL S. PARK, R.P.E.*

DURING the past year or two there have been serious corrosion problems involving brine coils in ice skating rink service. The cases are somewhat in parallel since both involve the discovery of piping failures after several years of idleness as a result of the war.

One deteriorated installation, on which an investigation was made, involved a rink that had been completely repiped and pressure tested with brine in 1942 and leased by the U. S. Government for storage of war materials before the arena could be used for skating purposes. The system was drained but not flushed and remained under those conditions for over four years.

When this rink was returned by the Government to the owners in August, 1946, pressure tests immediately were conducted to determine the condition of the brine coils and almost every coil was found to be either leaking or badly corroded. The failures occurred with regularity in approximately 3 ft. long sections of the coils where they extended into or out of the edge of the concrete slab base.

From visual inspection of the failed piping it was evident that corrosion had progressed from the inside to the outside of the coils. Chemical analysis of the corrosion products revealed a substantial proportion of chlorides and calcium oxide indicating conclusively that a breakdown of the calcium chloride brine in the presence of air and moisture had occurred, setting up an acid condition which, over a period of years, had proved sufficiently aggressive to corrode the pipe to the point of failure. The ends of the coils were solidly connected to the supply or return header and it was assumed that the obstructions to drainage in the form threaded fittings, reduction in pipe size, and possible elevation of the ends of the coils because of the fixed connecting risers, were sufficient to permit small pools of aerated brine to remain in the system during and after gravity drainage.

A study of skating rink data available in the Engineering Service Department of A. M. Byers Company, Pittsburgh, and discussions with ice skating rink operators resulted in the formation of several useful recommendations regarding the care of the brine system during both operating and non-operating periods, particularly the latter.

Suggested Protection

During the skating season, it is agreed by experts in the refrigeration field that the pH of a brine solution should be maintained in the 8.0 to 9.0 range, with 8.5 being a desirable minimum. Periodic tests are recommended, to be conducted by an authorized chemist or laboratory to accurately determine the alkaline, or acid, conditions of the brine. Test periods may range from one to six months, depending upon the operating characteristics of the individual system.

As added protection, some authorities suggest the use of the chromate type of treatment which has been widely accepted in the brine refrigeration field. This involves the use of chromate compounds which act as corrosion inhibitors through the formation of a stable, adherent, and non-porous film on the surface of the metal.

During the non-operating season, or periods of extended shutdown, the consensus of opinion is that the brine system should be kept full of alkaline brine with periodic tests being made at frequent intervals to ascertain the pH of the solution. As stated before, an absolute minimum of 8.0 should be maintained with a desirable low limit of 8.5. If the system is free of leaks and devoid of air no difficulty should be encountered in keeping the brine in a non-aggressive alkaline state.

These simple precautions have been followed carefully by the engineers in charge of the Duquesne Gardens Ice Rink in Pittsburgh and, despite the fact that there is no record of the addition of corrosion inhibitors, most of the wrought iron coils installed in the original brine system in 1899 are still in use.

* Engineering Service Department, A. M. Byers Company.

A. M. Byers Company has available a technical bulletin that contains information on the care of brine coils. It is entitled Wrought Iron in Refrigeration and Air Conditioning Systems.

HE KNOWS YOU . . . AND YOU KNOW HIM

Your jobber knows your problems, and he knows the goods he sells. He is in a position to help you in many ways.

As a manufacturer of refrigeration products, we know, through experience, that the old fetish "that the middle man makes goods cost more," is absolutely incorrect. We know that through the service he renders, the goods actually reach the buyer at a *lower* cost.

WHY IS THIS A FACT?

As manufacturers, we know that if we sold direct, we would require billing, accounting, and shipping departments 10 to 20 times greater in personnel and equipment than we have at present. Our transportation charges would increase tremendously—our storage space would have to be enlarged. These and many other increased costs would necessarily have to be reflected in the price of the product to you.

YOUR WHOLESALER IS NOW BETTER STOCKED THAN ANY TIME DURING THE LAST 5 OR 6 YEARS, AND HE CAN MAKE SPEEDIER DELIVERY OF YOUR NEEDS.

In the distribution of our goods we have always consistently adhered to the selective wholesaler plan. We sell only sufficient of these in a locality to assure complete coverage of territory and trade. We refer all trade inquiries to the wholesaler.

When you want time-tested performance and built-in quality in refrigeration valves and fittings, use Mueller Brass Co. products and—give your business friend—the wholesaler, a call. ORDER THROUGH HIM.

MUELLER BRASS CO.
PORT HURON, MICHIGAN

N.A.R.C. SURVEY SHOWS 95% SELL COMMERCIAL EQUIPMENT

A $160,000,000 gross annual volume of business is indicated for members of the National Association of Refrigeration Contractors, based upon a representative sample of its membership, covering members in the largest as well as the smallest cities, and firms with an annual volume ranging from nearly two million dollars down to five thousand.

This volume comprises sale of equipment, installation jobs, and maintenance and repairs. The latter makes up about fifteen per cent of the total, and the other two classifications are about equal.

The kind of business done by the firms reporting is shown by the following figures, which also indicate the diversified nature of the business and the extent to which equipment is sold in the four classifications.

On Commercial Refrigeration
93% install and service 95% sell equipment

On Industrial Refrigeration
74% install and service 72% sell equipment

On Domestic Refrigeration
47% install and service 35% sell equipment

On Air Conditioning
75% install and service 71% sell equipment

The ratio of total overhead and operating expenses to gross dollar sales volume ranged generally between 20% and 30% with the average being about 25%.

A total employment of 6930 skilled mechanics for NARC members is indicated by the data returned.

31% of the firms employ union men.

This was NARC's initial effort to get some needed statistical information about the business, that could be used as a guide or measuring stick for members to size up their own operations with others.

Local Group Activities

The Refrigeration Contractors Association, Duluth-Superior Area, has just been formed, with Ken Draver, Superior Refrigeration Service, Superior, Wis., as president.

Other officers elected are: Orval Hursh, Hursh Refrigeration & Appliance, Superior, vice-president; Roy Hammerstedt, General Appliance Co., Duluth, Minn., secretary-treasurer; and Ted Luck, Gartner Refrigeration Co., Duluth, Sergeant-at-Arms.

The Board of Directors comprise the officers and Wyman Collier, Town & Country Mart; E. Dahlin, Baxter Co.; Fred Mosher, Fred Mosher Co.; and E. Muccilli, Duluth Fixture Co.—all of Duluth.

It becomes the 21st local association to affiliate with N.A.R.C.

Sixty Dayton refrigeration contractors, service engineers and mechanics met recently to initiate action on a refrigeration code for Dayton, with a provision for licensing, permits and inspections.

The meeting occurred at the Jamison Engineering Co. and was presided over by M. M. Jamison.

A special Code Committee was selected by those present, with L. O. Warner, Refrigeration Service Shop, Inc., as chairman.

N.A.R.C. was represented by Gerald Weston, executive vice-president, of Cleveland, and Ed. S. Wright, first vice-president, of Youngstown.

A safety code, with licensing of both refrigeration contractors and mechanics, and absolutely fair, reasonable, and impartial in all respects, was advocated by those present. The committee was instructed to proceed accordingly.

The former Arizona Refrigeration Association has changed its name to Arizona Refrigeration Contractors Association, and has adopted a new Constitution and By-Laws, prepared and recommended by N.A.R.C., with which the Arizona association is affiliated.

Headquarters are in Phoenix, and the present membership comprises 25 refrigeration contractors of all sizes and both union and non-union.

Officers elected at the Annual Meeting are: President, G. W. Lance, Ace-Lance & O'Hara Refrigeration Co.; Vice President, Burke Patterson, Climate Control Co.; Secretary-Treasurer, Kenneth Nash, Aircold Refrigeration Service; and Sergeant-at-Arms, Harlan Diehl, Commercial Refrigeration Service.

The directors comprise the officers and Roy L. Perry, Roy L. Perry Dairy Supply; E. McLaughlin, Arizona Engineering; Bill Houser, Karlson Machine Works; Frank Samuels, Frank Samuels Dist. Co.; and C. M. Tally, Tally Refrigeration Service.

The association covers the entire state of Arizona, but at present all the officers and directors are located in Phoenix.

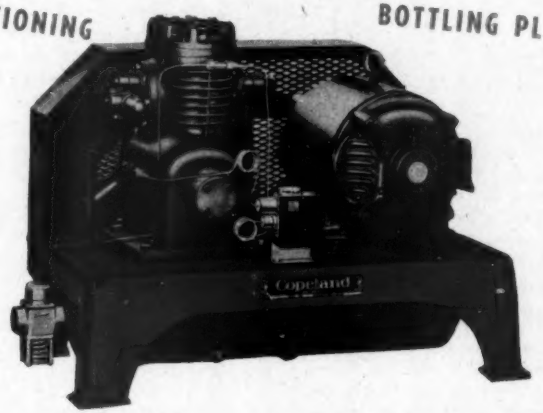
R. A. Connor, Buckeye Refrigeration Co., Columbus, was elected president of the Central Ohio Association of Refrigeration Contractors at the annual meeting held recently.

R. J. Creamer, Commercial Refrigeration

FOR A WIDE MARKET

LOCKER PLANTS
AIR CONDITIONING
WALK-IN COOLERS
SLAUGHTER HOUSES
NURSERIES
COLD STORAGE
DAIRY STORES
BAKERIES
FUR STORAGE
AIR CONDITIONING
BOTTLING PLANTS

IMMEDIATE DELIVERY



Copeland 3, 5 and 7½ H.P. Units

Aggressive sales action can be followed up with prompt delivery, thanks to Copeland's production achievement. Cash in on the big, waiting market. Profit on these top values for locker plants, walk-in coolers, large food and dairy stores and air-conditioning installations. Order these 3, 5 and 7½ H.P. units today!

MODEL 303-W	MODEL 503-W	MODEL 750-WFH
3 H.P.	5 H.P.	7½ H.P.
$739.00 LIST	$1091.50 LIST	$1429.50 LIST
With Control—Less Starter	With Control—Less Starter	With Control—Less Starter

COPELAND REFRIGERATION CORPORATION, SIDNEY, OHIO

Co., was elected vice-president, and W. H. Boye, United Refrigeration Service, was re-elected secretary-treasurer. Both are Columbus men.

A new Refrigeration Contractors Association of Oregon has been formed and affiliated with N.A.R.C. Headquarters are in Portland, 424 Failing Bldg., and the entire state will be included in the area served by the organization.

James Freeman is president, C. J. Bell vice-president, and Ranson D. Meinke, paid secretary. On the Board of Directors, with the officers, are Anton Broms, E. B. Morris and F. A. Rigby.

A big state-wide dinner meeting will be held in Portland June 12, to which all Oregon refrigeration contractors are invited.

* * *

AIR CONDITIONED BUSES IN SAN ANTONIO

THE old met the new in historic San Antonio recently. In front of the eighteenth-century Alamo, where, in 1836, a handful of stout-hearted Americans died to the last man in defense of their independence, San Antonio got its first glimpse of a 1947 innovation in transportation. The San Antonio Transit Co. formally unveiled the world's first air-conditioned city bus.

Fleet of 150 to Be Built

Air-conditioned by the Carrier Corporation of Syracuse, N. Y., the bus is one of a fleet of 150 to be put into service in this city. Fifty of the new buses will go into service this month. Thirty of these 32-seat ACF-Brill buses have already been delivered. In addition, 100 more ACF-Brill 40-passenger buses, also to be air-conditioned by Carrier, are in production.

The Carrier air conditioning plant of each bus is powered by a 16-hp. gasoline motor, separate and apart from the 165-hp. engine which powers the bus. The air-conditioning plant is a 5-ton unit which circulates its cool air through hundreds of small openings in the ceiling of the bus and through outlets over the seats. Two filters under the rear seat remove dust and odors from the air before cooling and circulation.

Initial experiments on the tremendous engineering feat of air-conditioning city buses were undertaken by the Carrier Corporation, the San Antonio Transit Co. and the makers of the bus nearly four years ago. By process of elimination, trial and error, it was finally decided to install a 5-ton unit in order to do the job. Such a plant will bring the temperature inside the bus a good ten degrees or more lower than that outside on the hottest days.

Body Construction

The bodies of the buses are heavily insulated with cork and rock wool. Windows are of Solex, a heat-absorbing glass, in sliding aluminum frames which can be locked.

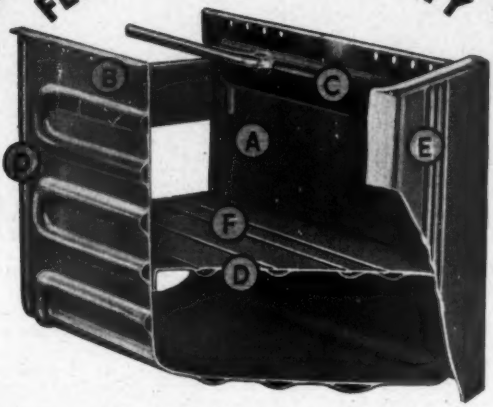
The Carrier air-conditioning plant includes a set of fans for even and forced distribution of the cool air in the summer. In winter, the same fans circulate warm air from under-the-floor hot water heaters through ducts along the floor to registers beneath the seats. Both winter and summer temperatures are controlled by thermostat.

The buses were constructed at a cost of $16,000 to $22,000 each.

World's first air-conditioned city bus unveiled. Pictured above are Frank D. Winslow and Joe W. Thiele who form the Thiele-Winslow Company, Carrier distributors for San Antonio. The San Antonio Transit Company will operate a fleet of 150 of the new 32 and 40-passenger Carrier air-conditioned buses.

STANDARD *Stainless Steel* EVAPORATORS

FEATURES OF QUALITY



A—Continuous Stainless Steel Construction
B—Universal Mounting Brackets
C—Built-in Accumulator—Adaptable to all Refrigerant Controls
D—Continuous Resistance Welded—With all Joints High Pressure Tested
E—Full Length—Two-Tone Aluminum Door
F—Stainless Steel Shelves—All Refrigerated

SOLD THROUGH LEADING REFRIGERATION WHOLESALERS

Standard Refrigeration Company

The Line of Quality

20 NORTH WACKER DRIVE ***CHICAGO 6, ILLINOIS***

California Association Meeting Sets Record Pace

FIRST WESTERN REFRIGERATION INDUSTRY EXPOSITION, SPONSORED BY CALIFORNIA ASSN. R.S.E.S. IS FORMALLY OPENED

With appropriate ribbon cutting ceremonies, the Western Refrigeration Industry Exposition, held in the Long Beach Municipal Auditorium, is formally opened by representatives of industry associations. The opening ceremonies were broadcast over Station KFOX.

Front row: H. T. McDermott, Chicago, International Secretary; W. W. Allison, Los Angeles, International President and Retiring State President; E. M. Flannery, Hartford, Conn., President, Refrigeration Equipment Manufacturers Assn.; J. Pat Riley, General Convention Chairman and President-elect California Assn.

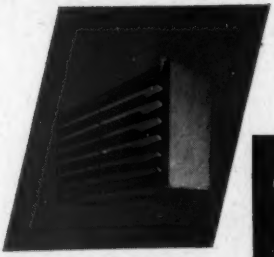
Rear row: G. S. Robinson, San Francisco, representing Refrigeration Equipment Wholesalers Assn.; Neil Templin, Los Angeles, Business Manager, Refrigeration Contractors Assn. of Southern California; B. R. Glazer, Los Angeles, Refrigeration Manufacturers Assn. of Southern California; R. W. Noll, Refrigeration Contractors Assn. of Los Angeles; Ralph N. Moore, President, Los Angeles Chapter, National Assn. Practical Refrigeration Engineers; E. L. Nelson, Chairman, Los Angeles Section, American Society of Refrigerating Engineers.

APRIL 25, 26 and 27 will long be remembered in the annals of refrigeration history on the Pacific coast. The annual meeting of the California Association of the Refrigeration Service Engineers Society and the First Annual Western Refrigeration Industry Exposition, sponsored by the California Association, brought to the city of Long Beach, Calif., some 500 members and guests directly identified with the industry, and approximately 3,000 customer visitors interested in the large exhibit of refrigeration equipment housed in the attractive Long Beach Municipal Auditorium.

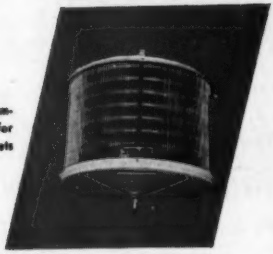
Headquarters for the association meeting was the Hilton Hotel located within a block's distance from the exhibits.

With arrangements carried off with clockwise precision under the untiring leadership of J. Pat Riley, Long Beach, general convention chairman and president-elect of the California Association and W. W. Allison, International President of the Society and retiring president of the California Association, the exposition hall was formally opened Friday evening, April 25, with appropriate ceremonies. President Allison, cutting the ribbon, signaled the start of an important event in the history of the California Association and Pacific coast refrigeration interests in general. Industry representatives, both national and local, assisted in the opening ceremonies which were broadcast over the local radio station.

The Cool Master
An efficient, cooling unit for walk-in refrigerators and other space cooling.



The Curvette
A new cooling unit of compact, distinctive design, for reach-in refrigerators, cabinets and counters.



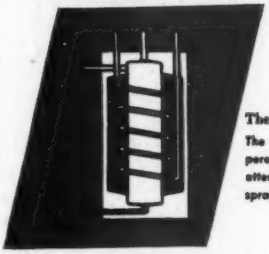
count upon

KRAMER

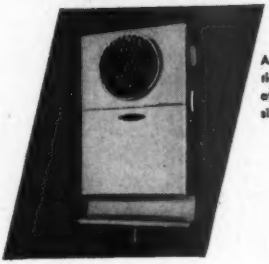
for ADVANCED ENGINEERING

Our business is that of manufacturing heat exchange equipment for the refrigeration industry. Our aim is to contribute to the advancement of the art. It is with some satisfaction that we review our latest achievements, including: the creation of a complete line of forced convection cooling units; the development of low temperature de-frosting equipment culminating in the invention of the Thermobank; and the maintenance of accurate capacity ratings for all equipment. RS

Radial Cooling Units
The original radial cooling unit for walk-in refrigerators.



Thermobank Automatic Defrosting
The only completely automatic low temperature defrosting system requiring no attention, no water sprays, no brine sprays and no electric heaters.



The Panel Unit Cooler
A highly efficient, compact, convection cooling unit for reach-in refrigerators — made in a complete line of sizes and capacities.

"IT'S THE COILS THAT COUNT"

KRAMER TRENTON CO.
TRENTON 5, NEW JERSEY

1947-1948 OFFICERS: CALIFORNIA ASSN. R.S.E.S.

Back row: Directors Frank A. Frazier, San Bernardino; Stillman Peck, Pomona; J. C. Rodgers, Los Angeles; Allyn Schoen, Sacramento; Treasurer, M. R. Hanks, San Diego; Director, Wm. E. Wharton, Oakland; L. L. Kannon, Bakersfield; Sergeant-at-Arms, Everett F. Brown, Compton; Ass't. Secretary, Vernon E. Denny, Pasadena; Director, Norman H. Overweser, Salinas.

Seated: 2nd Vice-president, A. H. Brundage, Fresno; Mrs. Gerald S. Kennedy, Sacramento; President, J. Pat Riley, Long Beach; 1st Vice-president, Rowland F. Cooke, San Francisco; Secretary, Gerald S. Kennedy, Sacramento; Educational Director, Merle Soden, Anaheim.

Front row: International Secretary, H. T. McDermott, Chicago; Retiring State President and International President, W. W. Allison, Los Angeles.

Forty-six exhibitors occupying eighty exhibits provided a colorful, educational display of the latest developments in refrigeration equipment. The exposition remained opened through Friday evening, Saturday and Sunday.

The exposition and meeting was a fitting observance of the founding of the first chapter established on the West Coast, ten years earlier. In June, 1937, Long Beach Chapter was chartered with 23 members and as hosts to the 1947 California meeting on their 10th anniversary, reported a membership of 107 members. Among the exhibits was an attractive display by the California Association and International Society, arranged by and under the supervision of W. C. Irving, Palm Springs, retiring educational director, where information was available on the State and International Associations' activities.

Friday Educational Session

The first educational session was opened on Friday afternoon, with Paul Reed, Milwaukee, Wis., Chairman of the International Educational and Examining Board, as principal speaker. Mr. Reed's talk was a report of the educational committee's activities and future plans, as well as an introduction of the committee's personnel. A major portion of his report was based on the results of a recent questionnaire circulated to all chapters in the Society, indicating their preference of subjects to be treated in future educational bulletins. These bulletins, Mr. Reed pointed out, would be so designed as to fit in with the service manual compilation which is the committee's objective.

Speakers on Saturday morning's educational program included E. M. Flannery, vice-president, Bush Mfg. Co., Hartford, Conn., and president-elect of the Refrigeration Equipment Manufacturers Assn., International Secretary H. T. McDermott, Chicago, publisher of THE REFRIGERATION SERVICE ENGINEER, and Dr. W. O. Walker, Marinette, Wis., Director of Research, Ansul Chemical Company.

(Continued on page 74)

PHOTOS OF EXHIBITS AND EXPOSITION HALL ON PAGES 70 and 72 BY NORMAN H. OVERWESER, SALINAS, CALIF.

NO WONDER KEROTEST VALVES

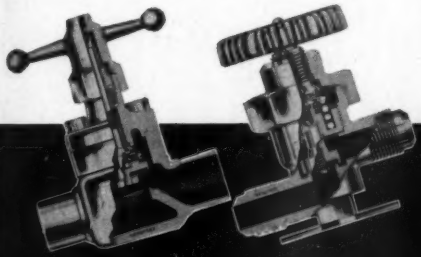
.... serve so well!
.... cost you so little!

Kerotest Valves and Fittings are precision engineered and precision made to give the kind of accurate and long lasting service your good reputation demands.

At Kerotest, every department is a precision shop where high accuracy machines guided by skilled craftsmen perform every operation *the best way*. Every part . . . every valve . . . every fitting, must meet Kerotest's exacting quality standards . . . *your* assurance that every one will "serve so well."

Modern production methods make Kerotest Valves and Fittings economical, too. Kerotest wants to assure you a fair profit . . . your customer good value at a price he can afford. Next time you need valves, ask for and buy Kerotest!

KEROTEST MANUFACTURING CO.
PITTSBURGH 22, PA.

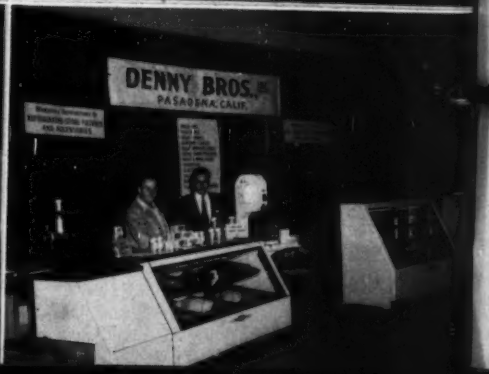


See your KEROTEST *Wholesaler*

AMERICA'S FIRST NAME IN QUALITY VALVES

SERVEL INCORPORATED

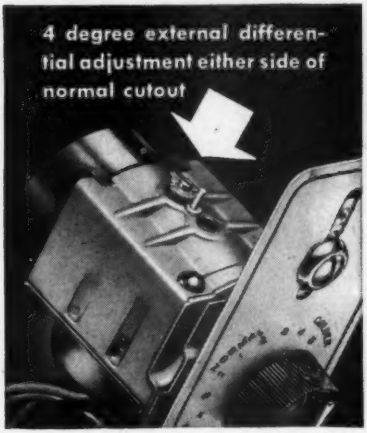
WESTERN REFRIGERATION EQUIPMENT
WHOLESALERS ASSOCIATION
MEMBERS


DENNY BROS.
PASADENA, CALIF.

FILLING ALL NEEDS

The Cutler-Hammer Line of REFRIGERATION REPLACEMENT CONTROL

This One Universal unit alone covers 60% of all needs.



Bul. 9521N9

Adjustable Mounting Brackets

Maximum Mounting Centers..... 4-3/16
Minimum Mounting Centers..... 2-3/16

Adjustable Cutout Feature—Differential can be increased 4 degrees by turning indicator in "Hi" direction and decreased 4 degrees by turning in "Lo" direction.

Adjustable Range—Turning screw clockwise lowers settings and counter-clockwise raises settings.

Operating knob can be adjusted to meet various evaporator scale settings. New knob is ideal for varying shield thicknesses. Makes *this* control adaptable to wider range of single dial replacement jobs where overload is not required in unit.

The Cutler-Hammer line of Refrigeration Replacement Control will meet all the refrigeration serviceman's requirements. One Cutler-Hammer Control Unit alone . . . the *Universal* Replacement unit . . . will handle 60% of his needs. And where exact replacement control is needed, that item also will be found in the C-H Exact Replacement Control line . . . individually packed, clearly labelled, complete with dial plate, mounting screws, trim washers and full instructions for mounting and adjustment.

Behind this line are 50 years of control specialization and thorough knowledge of merchandising requirements. Thus, the line is recommended by outstanding refrigeration wholesalers from coast to coast and alert service organizations everywhere use it to reduce investment in stock, to insure regular and rapid turnover, faster completion of the job, and greater all-round satisfaction. CUTLER-HAMMER, Inc., 1363 St. Paul Ave., Milwaukee 1, Wisconsin.

CUTLER-HAMMER
MOTOR CONTROL
C-H

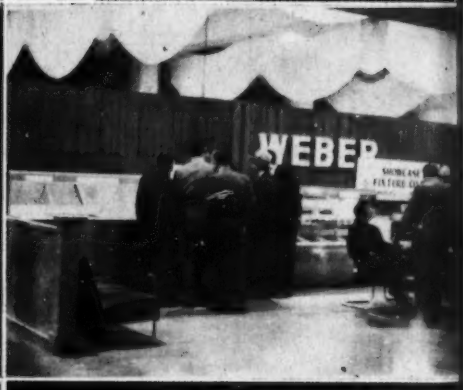
DOMESTIC, SEMI-COMMERCIAL AND COMMERCIAL CONTROL

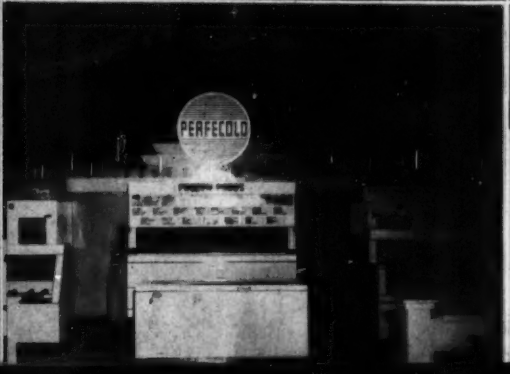
FRIGIDAIRE
MADE ONLY BY
GENERAL MOTORS

SIL-POS

REFRIGERATION CORPORATION OF

GEMCO AIR CONDITIONING—
ROYAL REFRIGERATION CO.
GEMCO


WEBER


PERFECOLD

CARL-CRAFT COMPANY
ULTRA COLD FREEZERS

SPREAD THE SUPPLY OF

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DU PONT METHYL CHLORIDE

- 99.5% PURE, DRY, UNIFORM
- IN ALL STANDARD CONTAINERS
- COAST-TO-COAST DISTRIBUTION

E. I. du Pont de Nemours & Co. (Inc.),
Electrochemicals Dept., Wilmington 98, Delaware.

DU PONT FOR QUALITY

DU PONT METHYL CHLORIDE

BETTER THINGS FOR BETTER LIVING THROUGH CHEMISTRY

DUPONT

CALIFORNIA MEETING

(Continued from page 68)

Mr. Flannery complimented the California Association on their progress and exhibition, stating that all associations in the industry had mutual problems and that working cooperatively each could contribute their share to the advancement of the field.

Officers 1947-48

President, J. Pat Riley, Long Beach.
1st Vice-president, Rowland F. Cooke, San Francisco.
2nd Vice-president, A. H. Brundage, Fresno.
Treasurer, M. R. Hanks, San Diego.
Secretary, Gerald S. Kennedy, Sacramento.
Asst. Secretary, Vernon E. Denny, Pasadena.
Sergeant-at-Arms, Everett F. Brown, Compton.
Educational Director, Merle Soden, Anaheim.

Directors

Stillman Peck, Pomona.
Wm. E. Wharton, Oakland.
J. C. Rodgers, Los Angeles.
Frank A. Frazier, San Bernardino.
Norman H. Overweser, Salinas.
Allyn Schoen, Sacramento.
L. L. Kannon, Bakersfield.

Mr. McDermott, outlined the growth of the Society in California and emphasized the increasing importance and responsibility of the service field in the refrigeration picture.

Dr. Walker, in an interesting presentation of his paper "Expansion Valve Troubles Due to Solids," summed up in easy-to-understand form the results of the laboratory work he had conducted for his company over a period of years in the study of moisture and wax in refrigerating systems. Dr. Walker's talk contained much factual data and his attentive audience was indicative of the valuable information he imparted.

Sunday Session

Sunday morning the retiring Officers and Directors met in joint session with the new

A CAPACITY CROWD ATTENDS BANQUET OF CALIFORNIA ASSN. REFRIGERATION SERVICE ENGINEERS ANNUAL MEETING

Members and guests "take time out" to enjoy the annual banquet, entertainment and dance in the Marine Room of the Hilton Hotel on Saturday evening, April 26.

STOP TERMINAL LEAKS!

on all sealed units in 5 minutes—with WATSCO REPLACEMENT TERMINALS

You can now repair terminal leaks on sealed units easily, quickly, profitably. Instead of 6 or 7 hours—5 minutes! Instead of removing the unit—work right on the job! Instead of welding and machining, use only ratchet wrench or pliers!

The remarkable WATSCO REPLACEMENT TERMINAL screws right over the original terminal post—seals the unit *instantly and permanently!*

$5.50 PER SET
(3 terminals)
ORDER FROM YOUR JOBBER BY NUMBER

#1 —for Crosley F-12 Unit

#2 —for Frigidaire—up to and including 1937

#3 —for Kelvinator, Norge, Westinghouse, Chieftian, Tecumseh, Philco, Frigidaire 1938 and later

—and here's the new, Lifetime WATSCO OIL RING PULLER

Removes the stubbornest oil ring in a jiffy! Cannot mar or damage ring or shaft. A quality precision tool —made of finest hardened steel, cadmium plated, hardened ball tip. Engineered for lifetime performance!

$7.50 EACH
ORDER FROM YOUR JOBBER

If jobber can't supply you, write us

THANKS, FRIENDS!
Your volume purchases of our precision products has required expansion of our organization—and removal to a bigger and most completely tooled plant. Formerly Wagner Products Co.
WATSCO

Dept. AB

WAGNER TOOL & SUPPLY CORP.
1308 43rd Avenue, Long Island City, N. Y.

Officers and Directors. With President W. W. Allison presiding, President-elect J. Pat Riley gave a comprehensive report for the convention, thanking the officers and members of committees for the excellent work they had accomplished. He expressed appreciation for the support of the exhibitors for the success of the exposition. President Riley received commendation of the association for his work as general chairman.

Under new business, Clarence Stumpf presented to International President a petition for the new San Gabriel Valley Chapter and introduced new members of the chapter who were present.

Everett F. Brown, president of Hub Chapter of Compton with a representative attendance of the chapter, received the charter for Hub Chapter in a presentation by President Allison.

Invitations were formally received to hold the next annual meeting and exposition in Santa Cruz and the San Francisco-Oakland bay area. A definite decision will be made at the Board of Directors' meeting to be held in Santa Cruz in September.

Entertainment

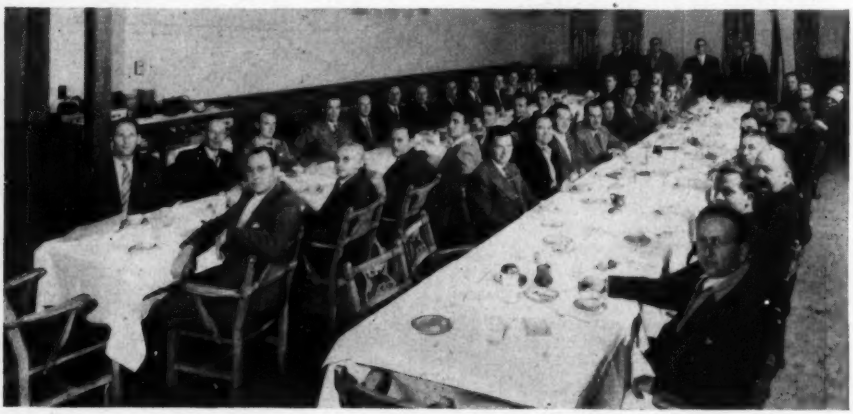
Principal entertainment feature of the convention was the annual banquet held in the Marine Room of the Hilton Hotel. Packed to capacity with 600 in attendance, President W. W. Allison introduced President-elect Riley and his 1947-1948 officers. Following the dinner a number of door prizes were awarded. Retiring President and Mrs. Allison were the recipients of gifts presented by President Riley on behalf of the association.

Committee members assisting the President and General Convention Chairman included, for the California Association: Educational Program, W. C. Irving, Palm Springs; Finance, M. R. Hanks, San Diego; Publicity, Vernon Denny, Pasadena; Program, Merle Soden, Anaheim; Arrangements, Everett Brown, Compton; Year Book and Directory, J. C. Rodgers, Los Angeles.

For Long Beach Chapter: Exposition Floor Plan, Garritt Van Ginkle; Housing, John Engle; Reception and Registration, Robert Schooler; Finance, Stewart Bell; Entertainment, Demi Voorhis; and Coordinating Chairman, Al. Haun.

Entertainment for the ladies included a bus tour of Southern California, Catalina Island, Knotts Berry Place, San Juan Capistrano and Laguna Beach. Acting as hostesses for the ladies were Mrs. J. P. Riley, Long Beach, Chairman; Mrs. V. E. Denny, Pasadena, in charge of registration, and Mrs. M. Soden, Anaheim, in charge of reception.

A 68-page souvenir program including a membership directory of members of all



ORGANIZATION MEETING, SAN GABRIEL CHAPTER, R.S.E.S., APRIL 3, 1947

Application for charter presented to International President W. W. Allison at meeting of California Assn., April 27. Officers of chapter are: Clarence Stumpf, *President;* W. L. Flewelling, *1st Vice-President;* Gustav Hilbert, *2nd Vice-President;* Robert I. Partridge, *Secretary-Treasurer;* Omer W. Dierker, *Asst. Secretary-Treasurer;* Vernon E. Denny, *Educational Director;* Don N. Armstrong, *Sergeant-at-Arms.*

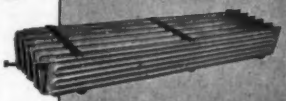
KOLD-HOLD

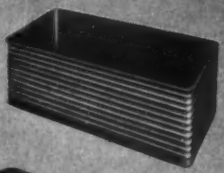
EVAPORATOR PLATES

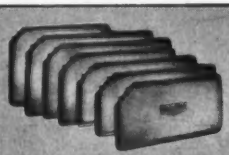
For ALL Lowside Applications

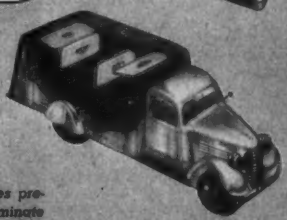
The New Kold-Hold "Quick-Action" Serpentine Plates offer outstanding economies and efficiency. Specifically, these plates either used separately, in banks, in plate stands, or as complete cabinet liners, assure you the following advantages:

1. Easy installation.
2. Maximum prime surface.
3. Highest rate of plate heat acceptance.
4. No possibility of short circuiting the flow of refrigerant which flows in one continuous pass from inlet to outlet.
5. Oil logging positively prevented.
6. Minimum pressure drop.
7. Tested to 300 lbs. per square inch pressure.
8. Has an appreciably higher "K" factor.
9. Thoroughly cleaned and dehydrated.









For transportation of perishables, Kold-Hold Truck Plates prevent loss from spoilage, preserve truck bodies and eliminate unnecessary time losses from loading and unloading.

KOLD-HOLD *(Write for Complete Catalog!)*

KOLD-HOLD MANUFACTURING COMPANY, 502 E. Hazel Street, Lansing 4, Michigan

California chapters was distributed at the meeting.

Chapters of the California Association are: San Diego; Long Beach; Los Angeles; Arrowhead (Riverside, Redlands, San Bernardino, Colton); Old Baldy, Pomona; Hub, Compton; Kern County, Bakersfield; Fresno; Orange County (Fullerton, Anaheim, Santa Ana); Monterey (Monterey, Carmel, Salinas); Imperial Valley (El Centro, Calexico, Imperial, Brawley); Sacramento; San Gabriel Valley (Pasadena, Alhambra, Temple City, San Gabriel); Golden Gate (San Francisco); Oakland.

TRI-COUNTY CHAPTER TO HOLD 10TH BIRTHDAY PARTY

TRI-County Chapter announces that plans have been completed for their 10th birthday party to be held Saturday night, June 21, at the Baker Memorial Building in St. Charles, Ill. A dinner is to open the activities and Clem Berg, Entertainment Chairman, has arranged for Fox Valley Catering Service, well known caterer, to serve the banquet. Several entertainment acts are planned to make the affair something that will be remembered for many years.

Tri-County Chapter was one of the first chapters chartered and has been very active throughout its entire life. It has had many successful picnics and other affairs which have been of interest to its members as well as members from other chapters. Like other entertainment affairs, Tri-County extends an invitation to all R.S.E.S. members to attend their 10th birthday party. Reserved tickets can be obtained by writing Clem Berg, 748 S. Spencer, Aurora, Ill., who has charge of arrangements. Advance tickets are necessary to assure sufficient food from the caterer, and all reservations must be in by June 15th.

NEW CHAPTERS IN THE MAKING

● CHARLESTON, S. C. CHAPTER, *Charleston, S. C.*—The initial meeting of the Charleston group was held April 19th, with an attendance of 42. The first speaker of the evening was Henry Gillette of Ansul Chemical Co., on the "Freon" situation. Bob Graves of Atlanta, Ga. introduced Tom Carnell, who explained the objects and purposes of the Society, outlining benefits to be gained by membership and explaining the various classes of membership to be obtained. Temporary officers were elected including the following: J. L. Pardee, *President;* T. A. McKenzie, *1st Vice-President;* J. E. Corvette, Sr., *2nd Vice-President;* F. J. McGorty, *Secretary;* J. F. Bradley, *Treasurer;* and F. A. Baily *Chairman, Educational Committee.* Fourteen men signed application for membership and the petition for charter is being held open to allow sufficient time for others to sign applications and the petition.

● BORDER CITIES CHAPTER, *Ontario, Canada*—A group of men from the small cities along the Canadian American border in the Province of Ontario, have been holding meetings recently with the view to forming a chapter of the R.S.E.S. On April 18th the draft of the chapter's constitution and by-laws was read and discussed, and on April 25th the election of permanent officers took place. These officers are: Dewey Hamilton, *President;* Ted Jolliffe, *1st Vice-President;* Bud Houston, *2nd Vice-President;* Nels Johnson, *Treasurer;* Wilf Maybee, *Secretary;* Dave Smiley, *Sergeant-at-Arms;* Tom Savill, *Chairman of Board of Directors;* Van Waffle, *Educational Chairman.* Directors—Rae Miller, Dick Bannister, Lorne Kettlewell, Erie McDonell, Everett Arrand and Ab Wilson.

● HINDS JR. CHAPTER, *Raymond, Miss.*—Charter presentation night for the Hinds Jr. Chapter was a very lively affair. The charter was presented by E. A. Summer, Refrigeration Instructor of Hinds Jr. College and former International Director. Presentation was made to G. L. Moore, Vocational Educational Director of H.J.C. Officers of the chapter are: G. L. Moore, *President;* L. C. Wages, *Vice-President;* E. A. Summer, *Secretary;* A. P. Jones, *Treasurer;* A. E. Peterson, Jr., *Sergeant-at-Arms.* Board of Directors—W. M. Young, Jr., Chairman; R. R. Berry and P. M. Smith. The meeting was preceded by a fish

COMING CONVENTIONS

Alabama Association
Place: Admiral Semmes Hotel
City: Mobile, Alabama
Date: October 17, 18
Chairman: T. O. Cooper, Harris Supply Co., Mobile, Ala.

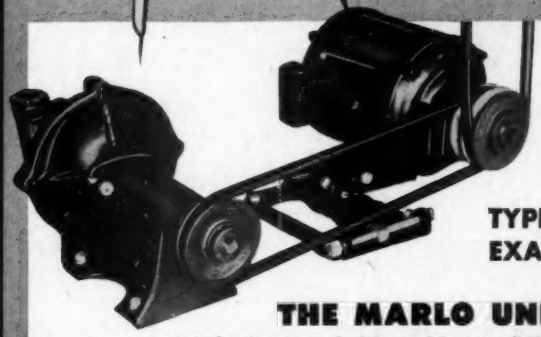
National Locker Convention
Place: Municipal Auditorium
City: Kansas City, Mo.
Date: September 25, 26
Director: R. R. Farquar, 656 Insurance Bldg., Omaha, Neb.

Illinois State Meeting
Place: Baker Hotel
City: St. Charles, Ill.
Date: November 1, 2
Secretary: R. E. Saunders, 730 Towanda Ave., Bloomington, Ill.

RSES Annual Convention
Place: Hollenden Hotel
City: Cleveland, Ohio
Date: Jan. 21, 22, 23, 24, 1948
Secretary: H. T. McDermott, 433 N. Waller Ave., Chicago 44, Ill.

R.E.M.A.—All-Industry Exposition
Place: Cleveland Public Auditorium
City: Cleveland, Ohio
Date: January 26-29, incl., 1948
Secretary: R. Kennedy Hanson, 1107 Clark Bldg., Pittsburgh, Pennsylvania

Marlo MEANS SOUND ENGINEERING ...in every detail



TYPICAL EXAMPLE:

THE MARLO UNIDRIVE

A single motor powers *both Fan and Pump* on all Marlo Spray-Type Industrial Coolers, Evaporative Coolers, Condensers and Cooling Towers. This simplified drive:

- Assures uniform belt tension — automatic take-up
- Eliminates special extended-shaft motors and pumps; simplifies electrical wiring
- Increases efficiency — reduces operating costs
- Standard units permit easy field replacement

You get more for your money from

MARLO

HEAT TRANSFER EQUIPMENT

Ball-Bonded Blast Coils — Cooling and Heating • Air Conditioning and Refrigeration Apparatus • Industrial Blower Units • Unit Coolers • Evaporative Condensers and Coolers • Low-Temperature Apparatus • Cooling Towers

Write for Bulletins

MARLO HEAT TRANSFER

MARLO COIL CO. • ST. LOUIS 10, MO.

In the upper picture E. A. Summers presents the charter to G. L. Moore, President of the Hinds Jr. chapter. The bottom picture is a view of some of the chapter members at work in the training shop of Hinds Jr. College.

To the south of us in the group of islands known as the West Indies lies Puerto Rico, a land of warm climates, rich fertile fields and beautiful scenery. Among the modern conveniences of living on the island is, of course, American made refrigerating equipment sold, installed and maintained by men and companies represented by the above. In this picture, left to right are: Mario Valentin, Enrique Cintron and Geravdo Alseaux of the Enrique Cintron Refrigeration Service Co. They are one of the leading service companies of the island.

supper and during the meeting various guests gave talks, including one from Chief Coach John Reed on "Cooperation and Good Sportsmanship Both in Sports and Business."

● LITTLE EGYPT CHAPTER, *W. Frankfort, Ill.*—Presentation of the chapter's charter was made by A. L. Robertson, International Director, on May 7 at a meeting held at the Koehl Refrigeration Co. in W. Frankfort, Ill. Speakers from Detroit Valve and Ranco were present and 39 charter members received their membership cards and certificates. Officers for the chapter are: Louis T. Koehl, *President;* Fred Rott, *1st Vice-President;* Autie Hightower, *2nd Vice-President;* G. G. Patton, *Secretary;* Fred Warmelink, *Treasurer;* James Bailey, *Educational Chairman.* Little Egypt Chapter comprises towns in the southern part of Illinois including West Frankfort, Marion, Mt. Vernon, Harrisburg, Herrin, Christopher, Sparta, Flora, Cairo, DuQuoin, Murphysboro, Salem, Lawrenceville, Olney, Carmi, Vienna and Fairfield.

● SCIOTO CHAPTER, *Marion, Ohio*—It is reported that the charter of this chapter will be presented some time in June. Earl Yockey, International Director who was instrumental in forming this chapter, will present the charter.

● SOUTHERN ARIZONA CHAPTER, *Tucson, Ariz.*—Formation arrangements for the Southern Arizona Chapter have been completed and presentation of the charter was made by International President W. W. Allison on May 12.

● DUKE CITY CHAPTER, *Albuquerque, N. Mex.*—Charter for this chapter has been granted by the International Society and President W. W. Allison made the presentation on May 20.

Chapter Notes

● ARROWHEAD CHAPTER, *Riverside, Calif., May 12*—J. Pat Riley, President of Long Beach Chapter and the guest of the evening, spoke briefly on the forthcoming convention. Merle A. Soden, President of the Orange County Chapter and State Educational Director, followed with a talk on oil tests recently run, and asked for comments from the audience on their experiences with refrigeration oils used at present. John Schlemmer and A. F. Haberson of General Controls Co., presented a demonstration and discussion of refrigerant controls, using their glass evaporator to illustrate. General Controls Co. provided coffee and doughnuts as refreshments, and a General Controls expansion valve was raffled off with Ed Warner being the winner. Ed, however, turned the valve back to the chapter to be sold at auction and Mr. Soden purchased it, since he was the highest bidder. Two pocket thermometers, presented by Thomas Renzi of Van's Supply, Long Beach, were also raffled off.

● ATLANTA CHAPTER, *Atlanta, Ga., Mar. 28*—Charles S. Biggers was elected Secretary and Ed Rawls was elected President to fill unexpired terms. The parking situation in Atlanta came in for a good deal of discussion.

● CENTRAL ARIZONA CHAPTER, *Phoenix, Ariz., Apr. 7*—Election of officers to fill the term between April and June 30 took place with the following results: C. M. Tally, *President;* Kenneth E. Nash, *Secretary;* Joe Clark, *Sergeant-at-Arms.* Upon taking the chair, Mr. Tally appointed a membership, social and educational committee. The speaker of the evening was James A. Murphy, member of the Junior Chamber of Commerce and President of the Lions Club. Mr. Murphy was one of the air cavalcade to Mexico recently made

WATCH FOR THIS DISPLAY!

You will find this attractive display of THAWZONE and TRACE, illustrated here, on the counters of leading refrigeration equipment wholesalers throughout the country. Let it remind you that:

(1) THAWZONE, the moving dehydrant, circulates and searches out moisture, destroying it chemically. For new and reconditioned units, as well as old.

(2) TRACE is a highly effective refrigerant leak detector. Its stable red color reveals leaks instantly in old or new systems.

These two products are partners in purpose . . . to keep refrigeration systems at the height of efficiency.

HIGHSIDE CHEMICALS COMPANY

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by 73 Phoenix businessmen. He told of the prosperity boom now taking place south of the border, and the large amount of new building being done. He stressed the complete lack of air conditioning and refrigeration in this building.

● CENTRAL CONNECTICUT CHAPTER, *Hartford, Conn., Apr. 28*—Bernie Packtor of Tenney Engineering, Inc., demonstrated the operation of their expansion valve. He was assisted by Wm. Wyrough. The demonstration was very complete and interesting. Two short entertainment films were shown following this demonstration.

● CHARLESTON, W. VA. CHAPTER, *Charleston, W. Va., May 13*—L. K. Wright, field sales representative of Alco Valve Co. explained in a very lucid manner the practical concept of superheat, its measurement and importance in the effective functioning of low sides. With the able assistance of a serpentine glass evaporator coil hooked to a condensing unit using "Freon-12," he demonstrated Alco TXV operation.

● CHICAGO CHAPTER, *Chicago, Ill., May 13*—Jack Glass gave a short talk on customer relationship. He was followed by Mr. Grover of Bussman Mfg. Co. who presented some interesting slides on fuses, fustats and fusetrons. He provided the membership with literature and answered many questions from the floor.

● DIRIGO CHAPTER, *Lewiston, Me., May 13*—Charter was presented to the chapter during an impressive ceremony by Charles C. E. Harris, International 2nd Vice-President. There were 65 in attendance at this meeting, 55 of whom were members of the new chapter. The meting was preceded by a banquet and President David J. Daris presided over the meeting. Permanent officers for the chapter, installed in office at this time are: David J. Daris, *President;* Robert Harlow, *1st Vice-President;* Edward Boudway, *2nd Vice-President;* Ralph A. Wagg, *Secretary;* Vincent DeAngelis, *Treasurer;* Amos G. Smith, *Sergeant-at-Arms.*

J. M. Strause and N. L. Sell of the Detroit Lubricator Co. provided the educational program with the showing of sound pictures on the operation of expansion valves, followed by a question period from the audience.

● ELM CITY CHAPTER, *New Haven, Conn., May 2*—The Nominating Committee's report on their choice of officers for the coming year was presented but the election held over until the next meeting. The Tenney Engineering Co. of Newark, N. J. presented a demonstration of their new thermostatic expansion valve connected to a glass evaporator. Refreshments followed the meeting.

● FAIRFIELD COUNTY CHAPTER, *Fairfield Co., Conn., Apr. 14*—M. E. Miller, president of the Electric Power Equipment Corporation, gave an interesting talk on the outlook of the refrigeration field. A Nominating Committee was appointed with the request that they report at the next meeting.

● FOX RIVER VALLEY CHAPTER, *Fond du Lac, Wis., May 7*—A nominating committee was appointed by the President, then George Thuerwachter gave a talk on the repair of sealed units. Refreshments were served.

● LIMA CHAPTER, *Lima, Ohio, Apr. 17*—Earl Jennings of Temprite Products Corp. covered operating principles, applications, installation and maintenance of Temprite coolers in a very interesting talk. The service problems of these coolers became the subject of a round table discussion following Mr. Jenning's talk.

● METROPOLITAN NEW YORK CHAPTER, *New York, N.Y., Apr. 25*—Anthony Tirranno of the Stanco Company spoke on the subject of Thor's new compound designed to prevent freezer doors sticking and the prevention of frost forming on evaporator coils. Mr. Tirranno passed samples of this compound around to the audience and answered many of the questions from the floor. The second talk came from Mr. Roland of Lake Chemical Co., manufacturers of Pipetite-Stik, pipe joint compound in pencil form. Mr. Roland also passed samples to the audience, together with explanatory literature. The third talk was given by the Chairman of the Educational Committee in lieu of a representative of the Premier Company who was unable to attend. The talk was on the self-aligning valve grinding kit made by the company. They provided Mr. Krasner with a sample kit which he demonstated on a drill press set up at the meeting for the occasion.

● MONUMENTAL CHAPTER, *Baltimore, Md., Apr. 8*—The annual election of officers took place at this meeting with the following results: J. Scherr, *President;* C. Taylor, *1st Vice-President;* F. J. Piper, *2nd Vice-President;* E. H. Pittman, *Secretary;* C. H. Elliott, *Treasurer;* W. F. Houpt, *Sergeant-at-Arms;* Geo. J. Roche, *Chairman, Educational Committee.* Executive committee—August Huber and Jack Ottenheimer. On the educational program the movies "Locating and Repairing Leaks" and "Adding and Removing Refrigerant" were shown.

● MOTOR CITY CHAPTER, *Flint, Mich., Apr. 22*—Mr. Converse of the Sperti Lamp Co. gave a talk on the construction, use and value of the ultra violet lamp.

● ONTARIO MAPLE LEAF CHAPTER—*Toronto, Ont., Mar. 21*—Al. Britton of Weathermakers of Canada, Ltd., who was the speaker of the evening, talked on the subject "The Air we Breathe, Its Properties, and Treatment Through Air Conditioning." It was a very interesting talk enjoyed by the entire attendance. The annual election of officers resulted in the following: C. W. Moore, *President;* O. B. Frayne, *1st Vice-President;* C. Heilig, *2nd Vice-President;* R. G. Henderson, *Secretary;* T. A. Tran, *Recording Secretary;* G. A. Burns, *Treasurer;* W. Harford, *Sergeant-at-Arms;* A. E. Doan, *Chairman, Educational Committee.* Board of Directors—J. W. McKee, Chairman, J. H. Stoliker, I. Thompson, W. J. Marshall, G. A. Olmsted, K. Wood and E. Ridsdill.

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A revolutionary time-saving instrument that tests and sets the superheat requirements for *all* types of Thermostatic Expansion Valves. Provides laboratory accuracy on the job—eliminates all guesswork.

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A "must" service instrument that starts up defective compressor units without tearing apart the motor assembly, Starts both hermetic and open-type units up to ½ h. p. under actual working conditions—and may be left on the job for emergency service. 56 starting combinations.

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Model 3100—A precision pocket-size Tester that detects and analyzes thermostat defects without removing the control from the cabinet. Saves blind tampering with thermo controls.

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Facilitate the SAFE transfer of refrigerants in the shop and on the job. Lightweight, free-standing, portable, and color coded.

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● PENINSULA CHAPTER, *Newport News, Va., May 8*—The guest speakers of the evening, introduced by E. Zepkin, Educational Director, were Nat Williams, sales manager of the Norfolk Branch, and Andy Orr., both of the Frosted Foods Division of the Birds Eye Company. In the program presented by these gentlemen, the audience was, through the medium of motion pictures, taken on a tour describing Birds Eye frozen foods from the growth of the product in the field to finished product in the package. The tour included the cleansing, packing, weighing and inspection departments of frosted food products.

● ST. LOUIS CHAPTER, *St. Louis, Mo., Apr. 29*—Sam Wolff distributed several booklets from Union Electric Co., a steel rule with temperature chart from Detroit Lubricator Co., and a temperature conversion chart from Sporlan Valve Co. On the educational program of the evening, J. D. Merkle demonstrated the Temprite unit from which he provided Coca Cola drinks. Mr. Merkle included in his remarks the uses of Ranco controls, rounding out an enjoyable program. Vice-President Sam Wolff assisted Mr. Merkle by furnishing the refrigeration unit for the demonstration.

● TWIN CITIES CHAPTER, *Minneapolis, Minn., Apr. 1*—During the business session of the meeting the membership went on record as being wholeheartedly in favor of the International Society's proposed expansion of the educational program. They backed up their confidence with a vote to supply money from their treasury to support the program. On the educational program Carl Christensen explained the operation of the Gale Equalizer, in which an alcohol and water cooled condenser is used.

At the May 6 meeting the evening started with a dinner served in the cafeteria of Dunwoody Institute, which was attended by both chapter members and their wives. The men retired to their meeting room after dinner where the chapter's business for the evening was conducted.

● WESTERN MASSACHUSETTS CHAPTER, *Springfield, Mass., Apr. 8*—Messrs. Erwin Ludwig and Ulbert of the Alco Valve Co. demonstrated, through the use of a glass evaporator, the construction and operation of Alco expansion valves. A buffet supper was served after the meeting which added much to the enjoyment of the attendance.

At the April 22 meeting, the educational film on motor troubles and other electrical devices was shown.

● WOLVERINE CHAPTER, *Lansing, Mich., May 12*—The educational period was devoted to a discussion of the "Freon" situation and a talk by Don Renwick on the cost of reverse cycle heating compared with other heating methods. The April 28th meeting was devoted entirely to business.

LADIES AUXILIARY

● KANSAS CITY AUXILIARY, *Kansas City, Mo., Apr. 17*—Most of the meeting was devoted to business matters of the Auxiliary. It wound up by playing "fishing," won by Mrs. Hoover. This was followed by "funny answers" won by Mrs. Taylor, and "flower names," won by Hazel Brown. Coffee and donuts were served for refreshments.

At the May 15th meeting the ladies met at the I.O.O.F. Hall, and after completing business, devoted their time to the game of pinochle. High score for the evening was made by Hazel Brown. The ladies then joined the men in a buffet lunch furnished by Alco Valve Co. of St. Louis. All in all, 120 persons attended this luncheon. Other sponsors of the meeting were Forslund Pump and Machinery Co., and Superior Refrigeration Supply.

● TULSA, OKLA. AUXILIARY, *Tulsa, Okla.*—National Auxiliary Secretary, Mrs. J. Sackey, reports the formation of a new Auxiliary in the city of Tulsa, Okla. Members of the Auxiliary are wives of the members of Oil Capital Chapter. A charter has been presented and the organization is well under way with 26 members in the present group and the prospect of many more to come. Officers are: Mrs. Wathen, *President;* Mrs. Wight, *1st Vice-President;* Mrs. Andrew, *2nd Vice-President;* Mrs. Weaver, *Secretary;* Mrs. Hocker, *Treasurer.*

LICENSING BILL IN MASSACHUSETTS IS KILLED

A STRONGLY supported bill came very nearly reaching passage recently, which would have created considerable confusion in the State of Massachusetts. Thanks to the activity of the local chapter of the Refrigeration Service Engineers Society and of Harold C. Lambert, one of its members, the bill has now been buried in a committee where it will probably never come to life.

The International Union of Operating Engineers were promoters of the bill petitioning for a law introduced as House Bill 898 which would require that "No refrigeration system containing more than fifty pounds of refrigerant shall be maintained or operated in any building except under the personal supervision, direction and control of a duly licensed engineer or a person who has obtained a certificate of qualification from the department of public safety to operate such a system. Where the system contains two hundred pounds or less of refrigerant and is fully automatic, only one qualified operator will be required. No refrigeration system containing less than twenty pounds of refrigerant shall be maintained or operated in a public building or exhibition hall for exhibition or demonstration purposes except under the personal supervision, direction or control of such person."

The Western Massachusetts Chapter, upon hearing about the proposed bill, immediately appointed a committee of three to

NOW . . . a cold-box type "Serviceman"

RANGE
– 30° to
+ 65°!

Marsh does it again . . . first!

IT'S the celebrated Marsh "Serviceman" with range increased to match your ever-increasing work on quick freeze units. Yes, it now indicates from —30 to +65 degrees F. Along with this it has all the features of the original "Serviceman"—the same accuracy, same utility, same ability to tell you what's going on behind the closed door. Here is a "must" for your service kit.

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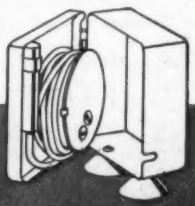
★ A heavy-duty precision movement, guaranteed accurate within one degree. Has Marsh "Recalibrator" to *keep* it accurate. Note hinged back containing bulb and 5 ft. of tubing slender enough to pass between refrigerator door and jamb. Suction cups prevent slipping and protect surfaces. The "Serviceman" is still available in ranges—10° F. to +100° F.



MARSH
Refrigeration Instruments

oppose it. Aid of other organizations such as the grocers association, hotel men and restaurant owners association was enlisted to fight the measure and finally succeeded in getting it postponed.

USE OF PLASTICS INCREASED IN NEW REFRIGERATORS

A FEATURE of 1947 home refrigerators, freezers and air conditioners is the increase in the use of plastics, according to a report by the Refrigeration Equipment Manufacturers Association.

Before the war, few plastics were used in refrigeration equipment, but manufacturers in the past few years have subjected plastic materials to strenuous and prolonged tests with the result that three to twelve parts now are made of plastic. One company has increased its use of the material to nearly one half million pounds for twelve parts per refrigerator in its current production. Another company has doubled the amount of plastics to nearly two million pounds annually.

Included in plastic applications in new refrigerators, frozen food cabinets and air conditioners are evaporator, fruit and vegetable compartment doors, frozen storage seals, shelves, shelf supports and shelf coating, drip trays, controls and knobs, handles, lamp shields, clock faces, name plates and decorative panels, glass door hinges, freezer lids, door liners and, in case of air conditioners, grilles, dials and controls.

ASRE ISSUES HOME FOOD FREEZER DESIGN PAMPHLET

RECOMMENDED design for various types of food freezers for home use, both city and farm, is presented authoritatively in a 12-page pamphlet, designated "Home Food Freezers"—Refrigerating Engineering Application Data 37, recently issued by The American Society of Refrigerating Engineers, 40 West 40 Street, New York City.

The pamphlet fills a need for reliable information on the subject of home food freezer design. Until the present, there have been few rules or approved practices for home food freezer design with the result that most purchasers of this equipment do not know what features are desirable. The industry as a whole has suffered from the lack of clear cut approved design procedure for home food freezers.

The pamphlet was prepared by R. H. Bishop, president of the R. H. Bishop Company, Champaign, Ill., with the assistance of the ASRE Technical Committee on Home Freezing and Storage Units, of which Mr. Bishop is chairman.

Among the subjects discussed in the pamphlet are the proper capacities for different size families, chest versus vertical types of freezers, insulation, door seals, defrosting methods, and controls. The relative advantages and disadvantages of hermetic and open types of condensing units are discussed in some detail.

SHIPMENTS OF REFRIGERATION

(Continued from page 47)

Almost all major classes of components and accessories and complete air conditioning equipment continued to increase. The major items increased as follows: Condensing units, 33 per cent, from $14.4 million in third quarter to $19.1 million in fourth quarter; self-contained air conditioning units, 18 per cent, from $5.4 million in third quarter to $6.3 million during fourth quarter; compressor units, 20 per cent, from $3.9 million in third quarter to $4.7 million in fourth quarter; heat exchanger equipment, 5 per cent, from $10.9 million during third quarter to $11.4 million during fourth quarter.

The largest percentage of increase took place in shipments of miscellaneous air conditioning and refrigeration equipment, which consists primarily of absorption systems. This equipment more than doubled in value, from $1.3 million in the third quarter to $2.6 million in the fourth quarter. Only one product, centrifugal refrigeration machines, showed a decrease in the value of shipments.

This release is based on reports submitted by 72 manufacturers of components and accessories and complete air conditioning equipment. Estimates were made for a few companies, representing only a small portion of the total industry, that did not submit their reports in time to be tabulated. The reports included in the release are believed to represent substantially all component manufacturers and air conditioning producers.

The shipment statistics included in the report apply to equipment actually billed and shipped. These figures are equivalent to complete sales. Complete units delivered on consignment or shipped to a branch warehouse for stocks are not included until such time as they are actually sold. The dollar values shown are the manufacturers' net

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FREEZE-UPS
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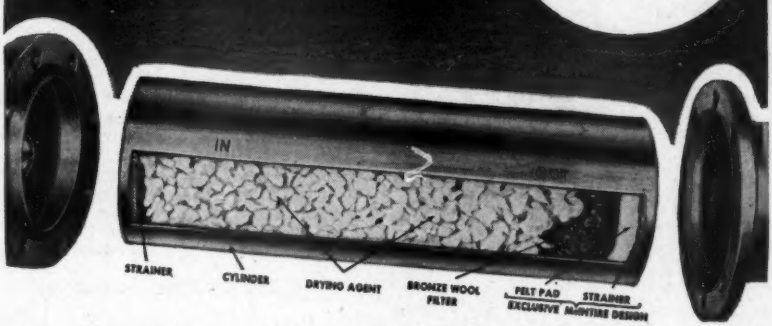
CORROSION



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DFN MOISTURE INDICATOR

Tells quickly if system is wet or dry. For Freon and Methyl Chloride. Simple, accurate, inexpensive. No shutting down of unit. Ask your jobber, or write for details.

• The DFN System stops those triple threats of trouble —moisture, sediment and acid. And it stops them in greater volume, thus, requires less recharging. Each DFN cartridge is scientifically factory-packed—provides complete refrigerant dispersion—insures thorough contact with the drying agent. Hermetic sealing preserves 100% dehydrating effectiveness. An exclusive filter-strainer traps the finest particles and holds more without pressure drop.

The DFN System is simpler and faster to service. Cartridge is easily replaced in the permanent shell—no fuss, no muss and no loss of dehydrating strength. This complete protection, greater capacity and servicing ease makes the DFN System the outstanding value in its field. Ask your distributor or write today for Catalog R-7.

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DFN SYSTEM

DEHYDRATORS • FILTERS
STRAINERS • NEUTRALIZERS

billing prices, f.o.b. factory. The data for some types of air conditioning and refrigeration equipments have been combined in the tables of this report in order to avoid disclosing the operations of individual companies.

KELVINATOR AND LEONARD

(Continued from page 45)

tively cool suction vapor absorbs some of the heat from the warm liquid passing through the liquid line, thereby increasing the efficiency of the system.

The purpose of the secondary system is to cool the glass enclosed lower section of the food compartment. This system is separate from the primary system as far as connecting tubes are concerned—it is dependent upon the primary system inasmuch as the actual refrigeration effect is brought about by only one condensing unit.

The actual physical changes that accomplish refrigeration in the secondary system are simply explained. The liquid refrigerant in the small diameter liquid line of the primary system expands into the larger tube surrounding the reservoir of the secondary system, cooling this reservoir. As indicated in Fig. 14, the refrigerant in the primary system then passes to the fast freezing shelf of the freezing unit, then down to the bottom of the freezing unit, through the injector tubes and then to the suction line. The reservoir referred to in the foregoing explanation is actually the secondary system condenser. As the low pressure liquid in the secondary system absorbs heat from contact with the food compartment liner, it vaporizes and returns to the reservoir (or secondary condenser) where it enters through a tube that is sufficiently long to bring the vapor in near the top. The refrigerant condenses to a liquid when contacting the cooled walls of the reservoir, then flows down through the secondary tube back of the liner to repeat the cycle.

1942 and 1946 Models

Mechanically, the 1942 and 1946 models have nothing notably new to offer over the 1941 models. There were some minor changes in the electrical circuit of the 1946 models which are illustrated in Fig. 15, but the Delco thermal relay was continued and the operation of the electrical system remained essentially the same.

ESTIMATING

(Continued from page 34)

Sub-Contractors

There are several parts of a refrigeration installation that cannot be done efficiently by a small contractor, such as electrical work, cement work, and sheet metal work. In the case of electrical work—most cities and towns require the work to be done by a licensed electrical contractor. The same thing may hold true for the other contractors. That is, there might be rules governing the installation of air ducts and cement work.

The usual procedure is to sub-let this work to a contractor who has the equipment and the know-how to handle it efficiently. If the job amounts to more than a few dollars it would be advisable to get at least three bids. However, it isn't always advisable to accept the lowest bid. Many times it is better to pay a little more and have the work done by a contractor you know is reliable. In fact, for small jobs it is sometimes better to let such work on a day labor basis.

Work with the Contractor

If, after a certain amount of experience, you find that a certain contractor is turning out your jobs with efficiency and dispatch, it may be that you can make an arrangement with him that will be advantageous to both of you. It frequently happens that a contractor has a slack period. If you could arrange to have some contractor do your work during these slack periods, he will be grateful for these fill-in jobs and will make you a better price than would be possible should you hold him to a strict time limit. The essence of using this method comes under good job planning. Try to plan your work far enough ahead so that sub-contractors can work on it at their convenience. Above all, avoid rush calls. Rush jobs always cost more money.

It is common practice to mark-up the sub-contractors bid by 10% to pay for the time and trouble of getting the bids and for sending out bills and checks. Some refrigeration contractors have a tendency to make a racket of sub-contractors work. They try to carry it as a separate item and do not include it in the refrigeration contract. In this way they can mark-up the sub-contractors bid exorbitantly and stick the customer for a higher profit. Such methods verge on chiseling and are not indulged in by reputable contractors.

COLD FACTS *mean* Cold Cash

The *New* J-B-T FIFTY-FIFTY Cold Zone Tester *Gives You the Cold Facts . . .*

SHOW the housewife, the store keeper and the cold storage manager the true refrigeration temperatures—before and after servicing—and you plainly demonstrate the value of your work.

Then, too, you yourself save time and dollars when you diagnose and service refrigeration equipment troubles with a J-B-T remote-reading temperature tester. Furthermore, it doesn't do you any harm to have the reputation for using the same modern, scientific methods that factory field representatives use.

The FIFTY-FIFTY tester is the newest in the J-B-T family of appliance temperature testers—a worthy companion for the famous Model 60-JRT oven and refrigerator tester now making money for its many users.

With scales of — 50° F. to + 50° F. and — 45° C. to + 10° C., the FIFTY-FIFTY is the compact, practical instrument for the man who needs to know "how cold?". Resistance bulb has a 14' polyethylene lead which permits the refrigerator door to be closed on it easily and safely. It is moderately priced because of quantity production.

For further details, see your distributor or write the factory for Bulletin 5050.

J-B-T

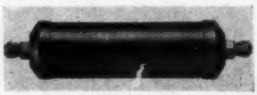
J-B-T INSTRUMENTS, INC.

483 CHAPEL STREET • NEW HAVEN 8, CONNECTICUT

Information contained in this department is furnished by the manufacturer of the article described and is not to be construed as the opinion of the Editor.

Dehydrators

AN ANNOUNCEMENT has been made by Cyrus Shank Co., 625 W. Jackson Blvd., Chicago 6, Ill., that copper dehydrators are now available after an absence of several years.



The non-rusting feature of these Shank Dehydrators makes them especially attractive for trouble-free installation.

Made in 2 sizes 2" OD and 1" OD—both provided with felt screens and felt filters.

The large size 2" is made with ¼" and ⅜" flare fittings. The ends are brass forgings with large hexagon area for easy service mounting. The copper tube is sweat fitted to the forging. The small size 1" OD is copper tube with spun ends. The brass end fitting, properly proportioned, is silver soldered.

New Frigidaire Unit

A NEW lightweight, rotary refrigeration mechanism for commercial and industrial application is being introduced by Frigidaire Division of General Motors to key sales and service personnel throughout the nation. Initial presentation of the new product was made during nine regional commercial meetings held late in April. The new refrigerating mechanism is basically of the same design as Frigidaire's household "Meter-Miser" unit.

Contained in a small compact package and weighing little more than 85 pounds, the new unit consists of a rotary compressor and motor assembly housed in a single, steel cylinder-shaped case. It is reported to be 25 to 50 percent lighter than comparable reciprocating models. The refrigerant condenser is mounted on a doughnut-shaped liquid refrigerant receiver, which wraps around the assembly. A small horizontal electric fan, mounted on the top and concealed by a grille, cools the unit. The mechanism is sealed and self-oiling.

Three models of varying capacities known as the MM-1, MM-2 and MM-3 are being produced by the company. The new unit is adaptable to a wide variety of commercial installations requiring remote-type refrigerating mechanism. It is well suited for cooling meat and vegetable display cases; reach-in refrigerators; beverage coolers; milk coolers and water coolers.

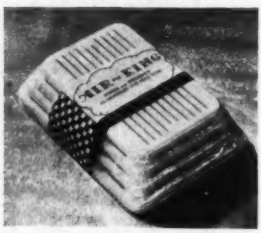
Brazing Rod

ALL-STATE Welding Alloys Co., Inc., White Plains, N. Y., announces the immediate availability in unlimited quantities of a new brazing rod for sheet aluminum. This rod has pleased those who have had the opportunity to use it and many others who have seen it in use. It makes smooth, clean joints and is particularly good for use on very thin sections of aluminum. It melts at a temperature well below the melting point of sheet aluminum and less preheat and less flux is required than for rods that have been previously available. The new brazing rod can be used without danger of burning through even the thinnest sheet aluminum used commercially.

This rod has been specially developed for repairing aluminum coach bodies, manufacturing furniture and cooking utensils, and for many other applications where its low melting temperature and economy in use are essential factors. It produces corrosion-resistant welds with good matching color and a tensile strength of 30,000 lbs. per sq. inch. This new product is known as All-State No. 31 sheet aluminum brazing rod.

Deodorizer

A NEW refrigerator deodorizer with active chemicals which kill odors, rather than just trapping them, is now



being marketed through jobbers by the Inter-Coastal Company, Inc., of Los Angeles, California.

Called "Air-King," the new deodorizer contains adsorb-

Boost your June-July-August...

Profits...

...with the NEW TEMPRITE Draught Beer Coolers

COOL DRAUGHT BEER flows freely in hot June-July-August weather and cooling equipment *must* be right to properly carry these greater loads. Now is the time to replace outmoded, defective equipment with the new Temprite Draught Beer Coolers.

So, put on your coolest working clothes and go to it, men! Introduce this great new Temprite in every tavern, club and bar in your territory.

Tell your customers about Temprite's ability to handle hot weather loads to perfection . . . with every *glass perfectly cooled, every glass perfectly clear!*

Tell them about Temprite's new all stainless steel coils that eliminate metal contamination, and deliver top-flavor beer!

Compact, highly efficient Temprite coolers provide trouble-free operation and greatly reduce service costs.

Don't let your summer-profit months slip away. *Wire Now!*

IN CANADA: Refrigeration Supplies Company, Ltd., 1127 Dundas Street, London, Ontario

COOLERS IN STOCK AT ALL LEADING WHOLESALERS

TEMPRITE PRODUCTS CORP.

Originators of Instantaneous 80° 40° *Liquid Cooling Devices*

45 PIQUETTE AVENUE DETROIT 2, MICHIGAN

ent chemicals plus safe, active chemicals which attack and destroy troublesome refrigerator odors. Will work in ice boxes as well as refrigerators.

Measuring 3¼" x 4½" x 1", it was especially designed to this small size so as not to impede air circulation in the refrigerator.

A white plastic case holds the chemicals in a spill-proof cloth bag. The case is wrapped in a cellophane jacket for protection before use. When placed in the refrigerator, the jacket is removed to allow circulation of air.

The active chemicals attack and destroy odors on contact, including the most offensive ones—cantaloupe, seafoods, cheese, kraut, onions, citrus fruits.

One Air-King will service refrigerators up to 9 cubic feet in size. Larger boxes require two. Constant protection of butter, milk and ice cubes from troublesome refrigerator odors is claimed for long past the manufacturer's one year guarantee. The device requires no baking, airing or re-activating.

The product has been in process of development and testing since 1937. Tests of the manufacturer, Hanson-Loran Chemical Co., have shown that it gives up to 5 times more deodorizing action in one-eighth the bulk at one-third the cost of non-active types.

Refrigerator

A SEVEN cubic foot two-temperature refrigerator that will hold 56 pounds of frozen food in the freeze chest and ice storage tray has been announced by the Appliance Division of the Westinghouse Electric Corporation.

The freeze chest has a rated capacity of one and a quarter cubic feet, or 43 pounds of frozen food storage, and the ice storage tray immediately under the freeze chest is rated at four-tenths of a cubic foot, or 13 pounds of frozen food. The freeze chest is refrigerated on the top, bottom, sides and back, and can be used for a limited amount of freezing as well as for its primary job of frozen food storage.

A manual "Temperature Selector" controls the temperature of the freeze chest, and a second automatic control regulates the temperature of the general food storage area.

Dimensions of the new model MF-7-47 are 30¼ inch width, 57⅝ inch height, and 25¾ inch depth. The cabinet is of all steel welded construction, finished in "Dulux." Food liner is white porcelain on steel, with acid-resisting bottom; shelves are of heavy rust-resistant wire. The new color trim framing the interior is called Apricream.

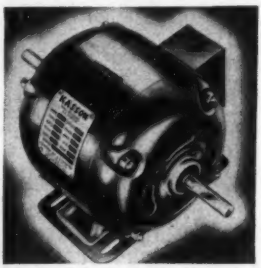
Equipment supplied with the model includes two 14-cube "Select-O-Cube" ice trays, two specially designed 14-cube trays that make it possible to remove one cube at a time, and two vegetable crisper containers, called Humidrawers, with a total capacity of one-half bushel of fruits and vegetables. Covers are ring-proof ribbed glass. Main food compartment arrangements are flexible, so that large items can be stored.

Further information may be secured from the Westinghouse Electric Appliance Division, Mansfield, Ohio.

Motors

THE 50,000th Kasson Rotomotor, first all-steel fabricated fractional hp. ball bearing electric motor ever built, has just come off the production line with several outstanding improvements, according to an announcement by David M. Kasson, president of General Die and Stamping Company, New York City manufacturers.

"An all-steel housing in an induction motor of this type is the first revolutionary improvement in the electric motor in forty years," Mr. Kasson declared. "Until we went into production somewhat over two years ago the skeptics insisted it couldn't



be done. The replacement of time-honored, bulky and laboriously machined castings with relatively light pressed-steel housings was indeed a difficult problem. Nevertheless we solved it, achieving perfect alignment in the bearing seat as well as complete rigidity, which were the two big factors involved."

Mr. Kasson reports that recent production of the Kasson motor includes specially designed baffles and louvres in the housing which result in low heat rise. In a test against three motors produced by leading manufacturers running side by side under identical loads, the Kasson ran coolest after eight hours of continuous duty. Also, the life of the motor has been increased considerably as the starting winding is now made from glass insulated wire, while the gun-metal oxidization of the starting mechanism before assembly minimizes rust in service.

Sealed-for-life ball bearings are standard equipment on all Kasson motors, but all

CESCO'S Healthguard Fume Kit (No. 605) offers *triple protection* to refrigeration servicemen. Quick-change filter cartridges assure safety against ammonia, methyl-chloride and sulphur-dioxide fumes . . . *all in one convenient carrying case.*

The soft molded rubber face-piece of the fume mask, and the adjustable headgear assure a gastight, comfortable fit for every wearer. Large safety glass lenses give perfect visibility.

The CESCO Healthguard Kit provides *economical* protection because it is *moderately* priced.

Write for CESCO'S *No. 605 Safety Bulletin for complete information*

CHICAGO EYE SHIELD CO.
2340 Warren Boulevard
Chicago 12, Illinois

CESCO
FOR SAFETY

GET THE JOB OPERATING FASTER!

NEW Premier Kit RECONDITIONS RECESSED OR FLUSH VALVE PORTS IN MINUTES!

Now you can easily grind, finish and test recessed or flush valve seats (either piston or flapper jobs) . . . get 'em back into action faster . . . and make satisfied customers! No more tiresome hand-lapping.

COMPLETE SET PACKED IN HANDY CASE

Contains self-aligning tool holder, 6 abrasive wheels for roughing, 6 cast iron lapping disks, two 3" cast iron lapping blocks, 1 wheel dresser and 1 valve tester. Complete instructions enclosed for handling ½" to 1¼" valve seats.

SEE IT AT YOUR JOBBER!

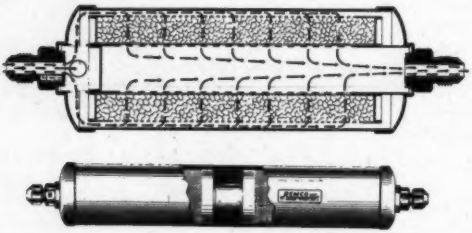
THE PREMIER CO.
891 PARK AVENUE • BALTIMORE 1, MD.

other parts and the tools and dies necessary to produce them are fabricated and assembled in the company's New York City plant, which is unusually self-contained.

The company has concentrated on the manufacture of ⅓ hp. split phase motors and in recent weeks has been turning out capacitor start units of the same rating for both 110 and 220 volts. When conditions in the raw material market permit, Mr. Kasson expects to produce a line of motors ranging from ⅛ hp. all the way up to one hp. in both split and three phase.

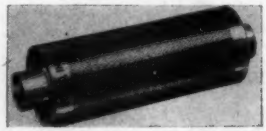
Drier-Filters

DURING the past ten years service engineers have been asking why someone doesn't build Heavy-Duty drier-filter at a reasonable price, that has plenty of drying agent and plenty of filter capacity.



This challenge, especially during the war when man power was so critical, started a new line of thinking about drier design and construction. Concentrated study of the problem indicated that much of the difficulty with conventional driers results from the large volume of high velocity liquid, especially during the initial part of the running cycle, which causes the drying agent granules to roll (grind against each other) and gradually pack so tightly together that they cause excessive resistance to refrigerant flow within the drying agent bed itself.

In an attempt to find a practical solution, Remco did some research and among other items studied was the common automobile oil filter that uses a cartridge which retains the filtering material in a cylindrical bed having a tremendous area, the flow being across the bed rather than from one end to another. Further study of this principal of flowing through or across a thin cylindrically



shaped bed appeared to be the answer to the problem. From numerous tests conducted, it was found that the resistance to the flow was nil. Since the filtering area was extremely large, the resulting flow area was also so far in excess of line sizes, it was found that "Cross-Flo" drier-filters could be successfully used in either the liquid or suction line, or between the refrigerant control and the evaporator.

Referring to the illustration, you will note that the flow is from the inlet fitting to a chamber opening into the cartridge from where the liquid or gaseous refrigerant flows up to and is distributed evenly over the entire surface of the cartridge, which has over 34 sq. inches of surface area, and 9 sq. inches of effective flow area (made up of 11,283 .032" perforations). This is referred to as the course-filter, since it removes from the refrigerant stream the large particles of foreign matter such as foundry dust and dirt, pieces of gasket material and other large particles that may often be found in larger commercial systems. After going through the course-filter, the refrigerant is further filtered through the thin cylindrical bed of drying agent, through which it virtually seeps, since the area over which it is distributed is so large. After passing slowly through the dry agent bed, the refrigerant then passes through the highly efficient fine-filter which has 14 sq. inches of effective surface area and over 4½ sq. inches of effective flow area. The fine-filter is made of 30 x 150 mesh dutch weave monel filter cloth which was developed especially for efficient filtering of refrigerants. To make a comparison the actual flow area through the filter is the equivalent of a $2\frac{7}{16}$" diameter opening and the 14 sq. inch of effective surface area is the equivalent of $4\frac{1}{4}$" diameter opening. After passing through the fine filter, which is supported by the inside perforated tube, the refrigerant then passes through the inside tube to the outlet fitting.

Flowing across the bed rather than through it (from end to end) so substantially reduced the velocity of the refrigerant that no rolling or packing of the granules is possible, even when used in the suction line or between the refrigerant control and the evaporator. Each drier-filter cartridge is packed with 18 cubic inches of silica gel. Since the relationship of the quantity of silica gel to the horse power or tonnage rating is only a suggested guide and often ignores entirely the resistance to flow through the drying agent bed and the filter surface and flow area, we recommend selecting Heavy-Duty "Cross-Flo" by refrigerant line size. If the job is known to be excessively wet and more drying agent capacity is indicated, select a tandem unit as illustrated.

Where only filtering is desired, the drying agent is eliminated and the cartridge is filled with loosely packed wool or similar filtering material, otherwise the design is the same.

Motorized Valve

A NEW, compact motorized valve will shortly go into production at Automatic Temperature Control Company, Philadelphia 44, Pa., for serving the commercial market as an adjunct to the company's line of industrial motorized operators for valves, burners and dampers.

Laboratory test records PROVE EVERY BEN-HUR FARM & HOME FREEZER

Part of Ben-Hur's great laboratory testing facilities.

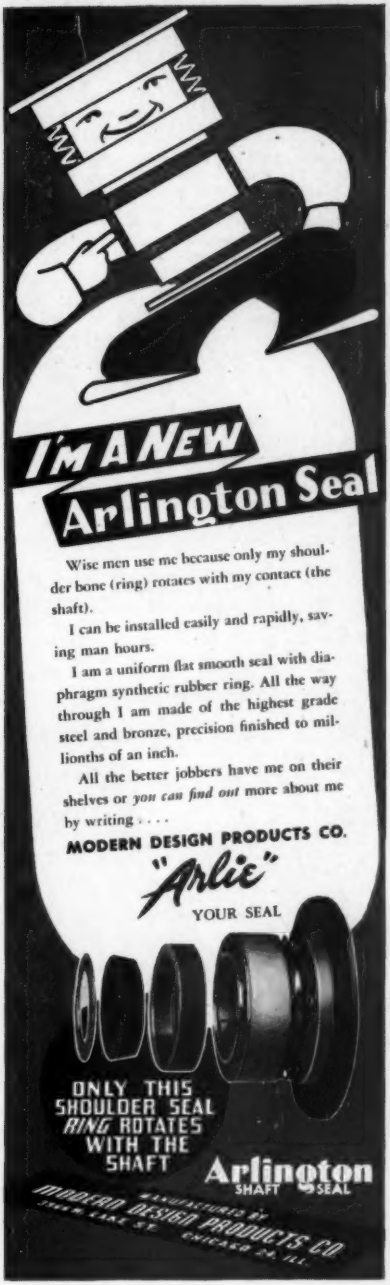
There's no guesswork about the superior operating efficiency of BEN-HUR Farm and Home Freezers. Long before you deliver and install them, each has a definite laboratory record on file at the factory . . . A file that shows, for instance, that each is tested to cycle on only a 1° temperature change instead of the ordinary 5° regarded as excellent control by most standards. Huge Ben-Hur laboratory test rooms prove the advanced engineering and skilled craftsmanship that assure you the finest of home freezers in a BEN-HUR.

Look into the BEN-HUR Line — for steadier income and lasting customer good will.

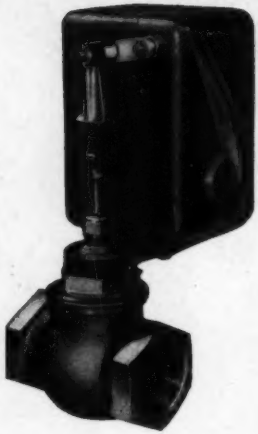
BEN-HUR MFG. CO.

Continuous Manufacturing Since 1911
DEPT. (RS) 634 EAST KEEFE AVENUE
MILWAUKEE 12, WISCONSIN

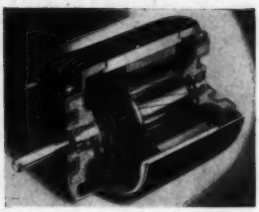
BEN-HUR FARM & HOME FREEZERS


I'M A NEW
Arlington Seal
Wise men use me because only my shoulder bone (ring) rotates with my contact (the shaft).
I can be installed easily and rapidly, saving man hours.
I am a uniform flat smooth seal with diaphragm synthetic rubber ring. All the way through I am made of the highest grade steel and bronze, precision finished to millionths of an inch.
All the better jobbers have me on their shelves or you can find out more about me by writing . . . .
MODERN DESIGN PRODUCTS CO.
"Arlie"
YOUR SEAL
ONLY THIS SHOULDER SEAL RING ROTATES WITH THE SHAFT
Arlington
SHAFT SEAL
MANUFACTURED BY
MODERN DESIGN PRODUCTS CO.
CHICAGO 24, ILL.

The new unit is especially adaptable for commercial machinery and equipment; heating and air conditioning systems; heating and cooling coils, etc. It provides automatic two-position (on-off) operation of valves for steam, air, gas, oil or water. A rugged induction type motor develops a positive power-drive through a worm and spur gear reduction. Limit switches are adjustable and are designed for trouble-free service. A sturdy cast iron housing is dust-tight and splash-proof; all parts are easily accessible. Electrical connections are made to a terminal block; half-inch threaded conduit provided. Requires a 3-wire thermostat, pressure switch or other similar instrument for actuation. Operates from either 24, 110 or 220 volts, A.C. power source.



Valves supplied: Globe-type, all bronze, either single or double-seated in sizes ½" to 2½" screw-end connections; butterfly valves, iron body, bronze trim in sizes 1" to 4" either screwed or flanged ends. Delivery four weeks.



inches total volume in oil reservoirs.

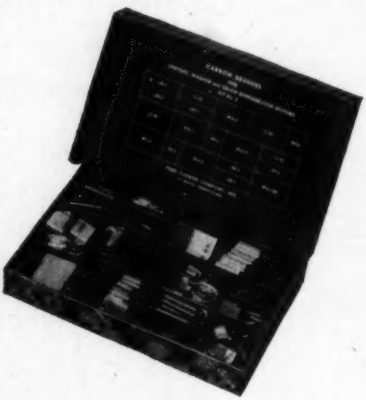
Circulating lubrication is said to permit continuous operation in any position for unlimited periods. Other features include lubricated silent thrust washers; patented flush-weld precision skewed rotor; humidity and oil resistant windings; controlled end play; sturdy die cast machined frame; fin-line functional styling with 198 square inches of cooling surface and internal air circulation.

Repair Kit

REFRIGERATOR motor repairmen will be interested in the Pure Carbon Co., Inc., St. Marys, Pa., Kit No. 4 now on the market. This kit contains 142 brushes of 19 separate sizes and styles. With a little sanding a brush from this kit will fit 90% of all refrigerator motors.

The kit is constructed of heavy, metal-edged cardboard, designed to withstand rough usage and to last for years. Each type of brush included in the kit comes in a separate, removable, metal-edged box. The lid contains a permanent chart for reordering items.

Kit No. 4 is a handy tool which should accompany the refrigerator repairman on every service call. It will save him time.



Micromotor

A NEW 1/20th horsepower, 4-pole shaded pole, totally enclosed A.C. motor, designed for continuous fan duty at 1500 rpm., is a recent addition to a line of low-range, fractional horsepower motors being manufactured by the Redmond Company, Inc., Owosso, Michigan.

Sold under the trade-name MicroMotors, these new units have 2 square inches of bearing surfaces with individually fitted bearings, spaced 5 inches overall and 6 cubic

Brazing Paste

WITH just a few strokes of a soft brush you can now preplace silver brazing alloy just where you want in an assembly by using Nu-Braze silver brazing paste No. 40.

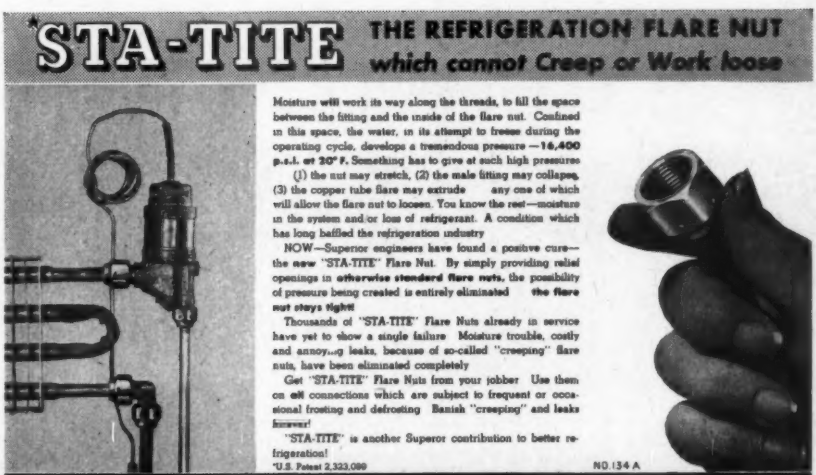
Nu-Braze Paste No. 40 is a new product in which a finely pulverized silver brazing alloy has been ground with a special flux into a smooth, paint-like paste.

The silver alloy component of Nu-Braze Paste melts at 1160 F. and will join all copper base alloys, steels, stainless steel, monel and inconel.

The special flux contained in this paste begins to melt at 480 F. and coats the joint area with a liquid protective film before the heat-generated oxides can form. The viscosity of this flux is so extremely low that the molten brazing alloy component gently eases all the flux out of the joint.

Nu-Braze Paste No. 40 is recommended for use in production work where you formerly used washers or thin strip. Or where your joint clearances are too close to depend upon capillary creep to pull the brazing alloy through the joint. Or where the joint area is inaccessible so that your part makes preplacement or feeding of the brazing alloy difficult, if not impossible.

For Liquid Cooling...
use
H X C
HEAT-X
CAST ALUMINUM LIQUID COOLERS
See your jobber for literature. Ask to see the Complete Heat-X Line.
THE HEAT-X-CHANGER CO., INC.
415 LEXINGTON AVENUE NEW YORK 17 N Y
BREWSTER N Y


STA-TITE
THE REFRIGERATION FLARE NUT
which cannot Creep or Work loose
Moisture will work its way along the threads, to fill the space between the fitting and the inside of the flare nut. Confined in this space, the water, in its attempt to freeze during the operating cycle, develops a tremendous pressure —16,400 p.s.i. at 20° F. Something has to give at such high pressures (1) the nut may stretch, (2) the male fitting may collapse, (3) the copper tube flare may extrude any one of which will allow the flare nut to loosen. You know the rest—moisture in the system and/or loss of refrigerant. A condition which has long baffled the refrigeration industry
NOW—Superior engineers have found a positive cure—the new "STA-TITE" Flare Nut. By simply providing relief openings in otherwise standard flare nuts, the possibility of pressure being created is entirely eliminated the flare nut stays tight!
Thousands of "STA-TITE" Flare Nuts already in service have yet to show a single failure Moisture trouble, costly and annoying leaks, because of so-called "creeping" flare nuts, have been eliminated completely
Get "STA-TITE" Flare Nuts from your jobber Use them on all connections which are subject to frequent or occasional frosting and defrosting Banish "creeping" and leaks forever!
"STA-TITE" is another Superior contribution to better refrigeration!
*U.S. Patent 2,323,089
NO. 134 A
SUPERIOR VALVE & FITTINGS COMPANY
PITTSBURGH — 26 — PENNSYLVANIA
OFFICES IN PRINCIPAL CITIES • STOCKS CHICAGO 16 • LOS ANGELES 21 • JOBBERS EVERYWHERE

News of the Equipment Industry

CENTRAL REWA. GOLF OUTING

THE Central Refrigeration Wholesalers Association, who are comprised of the following wholesalers; Airo Supply Company, The Harry Alter Company, Automatic Heating & Cooling Co., Automatic Temperature Supplies, Inc., H. W. Blythe Company, Chase Refrigeration Supply Co., Engineering Specialties Co., J. J. Koepsell Co., Fred C. Kramer Co., F. H. Langsenkamp Co., Gustave A. Larson Co., Marquette Equipment Co., Polar Supply Corp., Refrigeration Supply Jobbers, Service Parts Co., Thermal Co., Inc., and U. S. Electric Co., Inc., announce their Second Annual Wholesalers-Manufacturers Golf Tournament on June 20, 1947 at the Acacia Golf Course.

Arrangements are being made for a day of golf, winding up with a fine dinner at the Acacia Club Rooms. The Acacia Golf Course is recognized throughout the Middlewest for its fine rolling greens.

The committee in charge, promises some very nice innovations for those who will be present at the golf tournament. Mr. Pat Ravanesi of Service Parts Company, 2511 Lake Street, Melrose Park, Illinois, is chairman of the committee and reservations are being accepted now. The fee for the entire day has been established at $7.50.

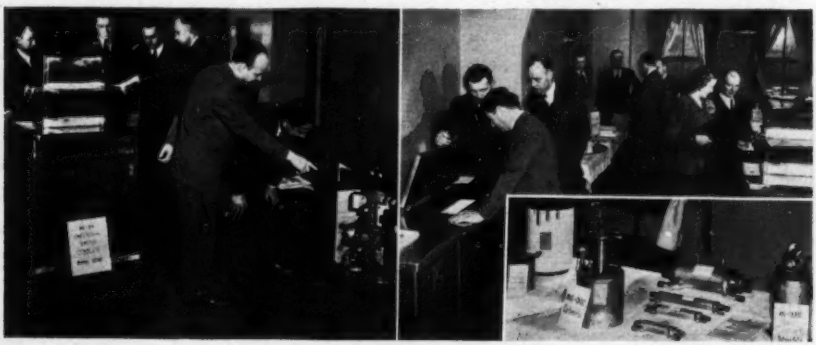
$ $ $

THERM-O-MATIC CHANGES POLICY

THERM-O-MATIC REFRIGERATION of Reno, Nevada, has discontinued all retail sales and service and is now confining its operation to the wholesale of refrigeration parts and supplies only.

The retail sales and service business of Therm-o-matic has been for the past year becoming a smaller and smaller part of the total business of the firm. Due to the growth and the expansion of power facilities to the ranchers and the mining areas in the state and Sierra Mountain area, the refrigeration industry in the area has increased its buying potential considerably. In this move Therm-o-matic will become the first strictly wholesale jobber in the entire state of Nevada.

For the past year Therm-o-matic has been supplying most of the small dealers, servicemen and some of the larger contractors with



The gentleman in the left foreground is Joe Simons. The occasion was a show held at the Bond Hotel in Hartford, Conn., by the Joseph Simons Company, at which they displayed refrigeration and air conditioning products sold and distributed by their company. The show enjoyed a good attendance and operated between the hours of 10:00 A.M. to 5:00 P.M.

Among the products shown were Gemco air conditioning units; a complete line of Heat-X-Changer water and beverage cooling equipment, including their cafeteria water cooler; freezers; Coolstream and Temprite water coolers; and Brunner and Air-rite beer pumps. All in all the show was very successful and a repetition is planned for an early date.

The Joseph Simons Company also held a luncheon on March 15th for their own people, celebrating their third anniversary.

LEAKY TERMINALS
ON ALL
SEALED CROSLEY F-12 UNITS

EASILY REPAIRED IN A FEW MINUTES WTHOUT OPENING THE COMPRESSOR

SET OF THREE TERMINALS (PART NO. 1020) **$6.75**

INSTALLATION TOOL (PART NO. 23051) **$1.65**

★ ★ ★

Part No. 1050—Packing Washers for Norge Terminals. Repairs terminal leaks on all sealed Norge units in cases where the terminals are not shorted. Installed from outside. 9 Washers **$1.00**

Part No. 1100—Complete terminal assembly for Norge units. Replaces shorted terminals on all sealed Norge units. Installed from inside. Set of three **2.85**

Part No. 1060—Complete terminal assembly for Frigidaire Meter-Miser units. Installed from inside. Set of three **2.85**

Part No. 1030—Complete terminal assembly for Westinghouse units. Installed from inside. Set of three **2.85**

★ ★ ★

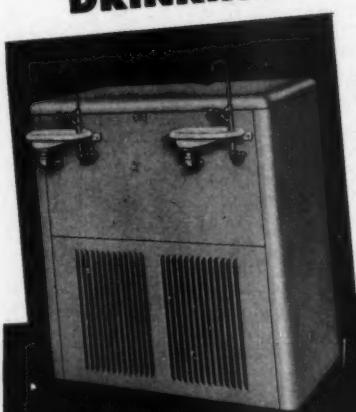
IMMEDIATE DELIVERY—MONEY BACK GUARANTEE

ORDER THROUGH YOUR SUPPLY WHOLESALER OR WRITE DIRECT.

WRITE FOR BULLETIN NO. 14 LISTING OTHER TERMINALS, FLOAT REPLACEMENTS AND ADDITIONAL PARTS FOR SEALED UNITS.

3097 Third Ave **SEALED UNIT PARTS CO.** New York 56, N. Y.

CABINET DRINKING WATER COOLERS



Glass filler or bubbler coolers are available with capacities up to 25 gallons per hour. Cabinet of heavy steel welded construction with white baked enamel surface. Also available now — normal and high suction pressure water coolers for commercial use.

Write for latest data.

DAY & NIGHT

REFRIGERATION DIVISION

DAY & NIGHT MFG. CO.

One of the Dresser Industries

MONROVIA, CALIFORNIA

SOLD THROUGH REFRIGERATION WHOLESALERS AND DEALERS

most of their refrigeration equipment, parts, supplies, gas, tools, and other needs.

The retail sales and service, formerly taken care of by Therm-o-matic Refrigeration, has been purchased by Western Refrigeration Sales and Service of Reno, Nevada.

S S S

STORE MODERNIZATION SHOW TO FEATURE REFRIGERATION

THE part played by refrigeration in the modernization of stores will be one of the principal features of the first annual Store Modernization Show to be held at Grand Central Palace, New York, July 7-12, it was announced by John W. H. Evans, managing director of the exposition.

On exhibition will be displays of the latest techniques of store exteriors, interiors and all the furnishings and decorations that make the modern store. In addition to air conditioning, refrigeration and heating equipment, there will be shown lighting fixtures, floorings, wall coverings, ceilings, paints, display cases, escalators, business machines, cash registers, mechanical and merchandising equipment, fixtures and all other related modern methods of winning and keeping customers will be shown.

Registration cards of admission may be obtained by writing Store Modernization Show, 20 East 55th Street, New York 17, N.Y.

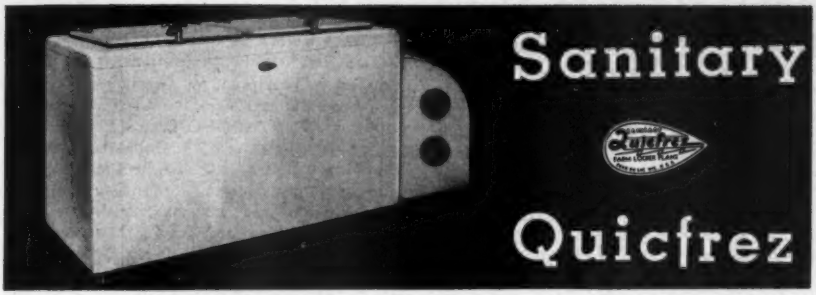
S S S

M. L. McELHANEY DIES

MYRON LeROY McELHANEY of Mechanical Refrigeration Supply Co., Inc., Huntington, W. Va., died on May 10th of a heart attack. He is survived by his wife, Elizabeth P. McElhaney.

Mr. McElhaney was born in Portsmouth, Ohio, in 1873. He was clerk of county court of Scioto County, Ohio, and in 1914 ran for Congress on the Republican ticket, but was defeated. He then traveled for Moore Oil and Refining Company of Cincinnati, Ohio. Entering the hardware business in 1920 in Huntington, his company became the Kelvinator distributor in 1922. In 1929 he became City Clerk of Huntington, under the Republican administration. At the end of his term in 1934, he organized the Mechanical Refrigeration Supply Co., Inc., continuing as secretary and treasurer until his death. He was taken sick on February 11 with a heart attack and was confined to the hospital for nine weeks. He had returned home for three weeks before his death.

Pictured in the above are a few of those in attendance at the Allied Supply Co., Dayton, Ohio, opening party held April 19. Pictured upper left are members of the company. They are left to right: Mr. & Mrs. Wm. V. Homan, Mr. & Mrs. John L. Homan and Mrs. & Mr. Jack L. Homan.
Photos by Austin Jones



THE PIONEER OF FARM LOCKER PLANTS

NOW READY FOR IMMEDIATE DELIVERY!

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FOND DU LAC, WISCONSIN

Manufacturers of Ice Refrigerators for Over 40 Years — QUICFREZ Farm Locker Plants Since 1939

NEW MANAGEMENT FOR NEW DUTY

NEW Duty, 2424 Irving Park, Chicago 18, Ill., has changed its management and is now under the supervision of Al Delliheim who hopes to be able to improve the delivery and service of customers' merchandise of water valves, thermostatic and automatic valves and controls and pressure switches.

* * *

NEW STEP TO SPEED RETURN OF EMPTY "FREON" CYLINDERS

OWING to the acute shortage of cylinders for "Freon" fluorine refrigerants, Kinetic Chemicals, Inc., has taken another step to speed returns. With a faster return of empty cylinders, faster shipments of "Freon" can be made, Kinetic officials said.

Kinetic, on June 1, is to discontinue the present practice of allowing credit only to the distributor or machine manufacturer who originally made a deposit for the cylinders. Under the new plan, credit or refund will be made by Kinetic Chemicals to whoever returns the cylinders directly to Kinetic.

The new procedure is an added service to customers in that it simplifies handling of cylinders and expedites credits or refunds and so eases the accounting burden upon all those who might be in a chain of handlers.

UNIVERSAL COOLER NAMES MANDERY SERVICE MANAGER

DAN MANDERY has been appointed Service Manager of Universal Cooler Division International Detrola Corporation, Marion, Ohio, manufacturer of hermetic, self-contained, and remote refrigerating condensing units. Mr. Mandery has been associated with the Hussmann-Ligonier Company, St. Louis, Mo., for the past ten years, and before that was a sales manager in the Omaha, Neb., area for Frigidaire Division, General Motors Corporation.

DAN MANDERY

NEW ELPECO REPRESENTATION

C. R. LOGAN, Sales Director of the Electric Power Equipment Corporation, of Philadelphia, Pa., announces several personnel changes.

Mr. H. F. Krantz has been appointed regional representative of the north central area. Mr. Krantz will handle the complete line of Elpeco Green Dragon commercial refrigeration and air conditioning equipment, contacting refrigeration wholesalers and manufacturers.

The new representative received his degree in Mechanical Engineering from the Illinois Institute of Technology in Chicago. During the war he was in action in the southwest Pacific, serving as Lt. (j.g.) on the submarine U.S.S. Lapon. Before entering the service, he was employed by Lyon Metal Products, Inc., Aurora, Ill.

H. F. KRANTZ F. J. MARSHALL

Mr. Krantz will cover Illinois, Missouri, eastern Montana, Wyoming, Colorado, North and South Dakota, Nebraska, Kansas, Minnesota, Wisconsin and Iowa from his temporary address at 807 Aurora Avenue, Aurora, Illinois.

The company has also announced that Alvin Dattle, formerly Procurement Manager of the Refrigeration Division in the Philadelphia office, will now act as midwest representative, covering Tennessee, Kentucky, West Virginia, western Pennsylvania, Ohio, Indiana, and Michigan. His duties will be the development of this territory and he will operate temporarily from the Philadelphia office at 412 N. 18th Street.

Frank J. Marshall will cover the Middle Atlantic territory of eastern Pennsylvania, central and southern New Jersey, Maryland, Delaware and Virginia. Mr. Marshall has had 20 years experience in the refrigeration field with such companies as York Corporation and Frigidaire. He will work from the Philadelphia headquarters.

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Building good will and increasing your service business is possible by taking Meter-Miser calls.

Locating the leak and recharging is one of the services you can render to Meter-Miser owners if you have a supply of **HERVEEN.**

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DOLE REFRIGERATING COMPANY CELEBRATES 20TH ANNIVERSARY

THE Dole Refrigerating Company, originator and developer of Vacuum Cold Plates, celebrates its twentieth anniversary June 27th. Originally incorporated in 1927 to build ammonia compressors, by 1930 the major part of production was devoted to equipment for the frozen food field including refrigerators, display cases, etc. It was at this time that the original Dole Vacuum Cold Plates were introduced. In 1935, Dole discontinued the production of cases and compressors to devote all efforts to the manufacture of Vacuum Plates which they still specialize in.

Among the early employees who are still with the company are: H. W. Kleist, Al Zemek, C. C. Ryan, H. E. Clay, R. E. Shaw, E. J. Tweed, L. A. DeMore and Walter Pelker.

\$ \$ \$

HUTCHINSON APPOINTED TO REPRESENT A.P. IN CANADA

NEWLY appointed Canadian representative of the Automatic Products Company of Milwaukee, Wis., is J. E. Hutchinson of Brantford, Ontario.

Widely known in the refrigeration and air conditioning and heating fields, Mr. Hutchinson has been associated with several large Canadian firms over a period of years. Though his headquarters are to be in Brantford, he will represent the Automatic Products Company throughout the Dominion, with the exception of British Columbia.

Mr. Hutchinson will handle the firm's complete line of "A-P Dependable" Refrigeration Valves and Oil Controls. The Refrigeration line includes: expansion valves, solenoid refrigerant valves, suction pressure regulating valves, water regulating valves, and the "Trap-Dri," a combination drier, filter and strainer, and "Trap-It," a filter and strainer.

Included in the Oil Controls for vaporizing burner appliances are: constant level oil controls, complete furnace sets, heat regulator conversion sets, fuel-oil "Trap-It" —and heat regulator sets for furnaces.

A-P refrigerant valves are stocked and sold by recognized Canadian refrigeration supply jobbers. A-P oil controls are used as standard equipment by leading manufacturers of oil burning appliances. Mr. Hutchinson will work closely with the jobbers and manufacturers assisting with merchandising and engineering problems.

NEW CATALOGS AND BULLETINS

AIRO SUPPLY COMPANY, 2732 N. Ashland Ave., Chicago, Ill., have just issued their new Buyers Guide No. 47A. It is a 112-page catalog of refrigeration parts, supplies and equipment.

They have used a new arrangement in this catalog designed to make it more convenient to use. Kindred lines are grouped to make it easy for the customer to compare different lines and to select the item he wants. In other words, the new catalog is departmentalized making it of greater value to the service field.

THE HARRY ALTER CO., INC., 1728 S. Michigan Ave., Chicago, Ill., with branch office in New York City, have just issued their new Dependabook No. 144. It is a 136-page catalog of refrigeration parts, supplies and equipment covering the entire needs of the service field.

Following their usual custom, the book contains eight colored pages of special low priced items.

TENNEY ENGINEERING, INC., 26 Avenue B, Newark 5, N. J., has just issued a 2 color bulletin on the new water defrost unit cooler for low temperature applications.

The bulletin, WD 47, illustrates and describes the method of defrosting with ordinary tap water. Diagrams show the proper method of installation and capacity table is given for the three sizes in which the Unit is made.

Included also is a dimension chart and a diagram which relates the chart to the principal dimensions.

FENWAL, INCORPORATED, Ashland, Mass., has published a new catalog describing their Thermoswitch Thermostats. In addition to presenting details of construction and application of these temperature controls the catalog contains an extensive section on methods used to obtain desired characteristics in various control installations.

The basic Thermoswitch is a small cartridge type unit which may be inserted in a pipe or well or be clamped on the surface. Ratings on 110 volt a.c. are from 10 to 25 amperes or one half as much on 230 volt circuits. Sensitivity is specified to range from 0.1 to 0.5 deg. F. plus or minus.

Catalogs are offered to interested individuals.

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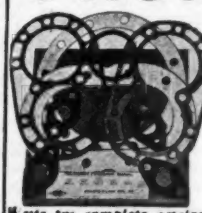

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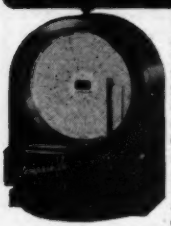

The TEMPSCRIBE Recorder is outstanding for its universality. Any TEMPSCRIBE can be quickly converted from temperature recording to time-operation recording simply by changing the door of the instrument. A widely-used combination comprises one clock case (having a 24-hour spring-wound movement) and two doors (one with a bi-metallic temperature element, and one with mechanism for recording motor on-and-off time). This economical set costs very much less than a dual recorder. Even two complete TEMPSCRIBES, to obtain simultaneous records of temperature and motor operation, cost no more than you would normally expect to pay for a single instrument that makes dual records, yet give you all the advantages of two separate instruments!

Bulletin 704 gives list of ranges, practical application data, and complete details.

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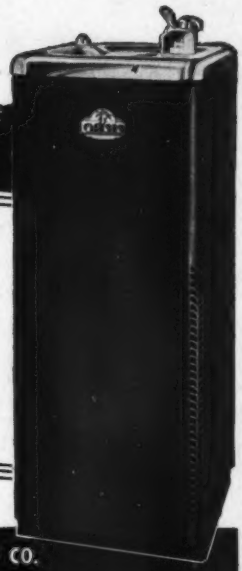

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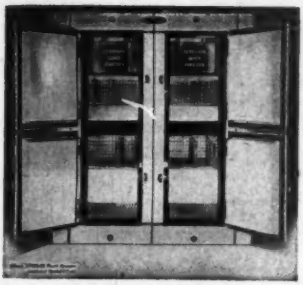

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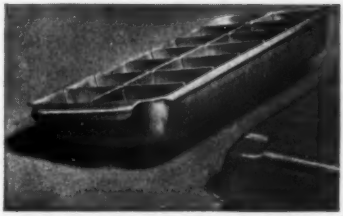

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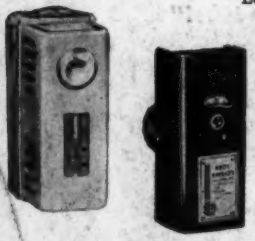

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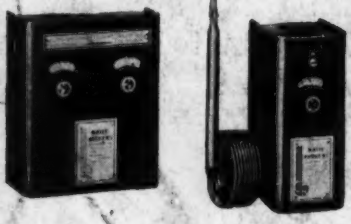

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